



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



E
S
1

EARTH
SCIENCES
LIBRARY

UNIVERSITY OF CALIFORNIA.

FROM THE LIBRARY OF

DR. JOSEPH LECONTE.

GIFT OF MRS. LECONTE.

No.





With the compliments of

W.S. Yeates,

State Geologist.





PLACER-MINING, AT THE WHITE PATH GOLD MINE, GILMER COUNTY, GEORGIA.

GEOLOGICAL SURVEY OF GEORGIA

W. S. YEATES, State Geologist

BULLETIN No. 4 — A

A PRELIMINARY REPORT

ON A PART OF THE

Gold Deposits of Georgia

BY



W. S. YEATES

State Geologist

AND

S. W. MCCALLIE and FRANCIS P. KING

Assistant Geologists

1896

QE101
P5
no. 4 A

EARTH
SCIENCES
LIBRARY

GEO. W. HARRISON, STATE PRINTER
FRANKLIN PRINTING AND PUBLISHING COMPANY
Atlanta, Ga.

ERRATA

1. On page 28, 4th line from the bottom, for "1872", read *1772*; and in the last line, for "Eleven years", read *Seventeen years*.
2. On page 43, 10th line from the bottom, for "outs de" read *outside*.
3. On page 51, 7th line from the bottom, for "lot 90", read *lot 70*; and in the 6th line from the bottom, for "just above the 20-stamp mill", read *just below the 20-stamp mill*.
4. On page 162, 2nd line, for "operate", read *work*.
5. On page 173, 3rd line, for "operate", read *work*.
6. On page 177, 2nd line from the bottom, for "stoping", read *and stoping*.
7. On page 180, 15th line, for "right bank", read *left bank*.
8. On page 190, 6th line, omit the words, "and the sandstone was penetrated".
9. On page 206, THE BELL PROPERTY, 1st line, for "329", read *829*.
10. On page 220, 2nd and 3rd lines from the bottom, for "The story, though somewhat exaggerated", read *The story, though probably somewhat exaggerated*.
11. On page 225, 6th line, for "eighty years", read *sixty years*.
12. On page 231, 9th line, for "cannot be verified", read *could not be verified*.
13. On page 247, at the end of the 4th line, for "by", read *at*.
14. On page 254, 5th line from the bottom, for "seven hundred pennyweights", read *several hundred pennyweights*.

THE ADVISORY BOARD

of the Geological Survey of Georgia

(Ex-Officio)

HIS EXCELLENCY, W. Y. ATKINSON, Governor of Georgia,

PRESIDENT OF THE BOARD

HON. R. T. NESBITT Commissioner of Agriculture

HON. G. R. GLENN Commissioner of Public Schools

HON. R. U. HARDEMAN State Treasurer

HON. W. A. WRIGHT Comptroller-General

HON. A. D. CANDLER Secretary of State

HON. J. M. TERRELL Attorney-General



SEPTEMBER 24th, 1896.

*To His Excellency, W. Y. ATKINSON, Governor, and President of the
Advisory Board of the Geological Survey of Georgia,*

SIR : — I have the honor, to submit, herewith, the report of myself and my assistants, Messrs. King and McCallie, on the Gold Deposits of certain counties in the State, to be published, as one of a series of economic bulletins, on this important source of our material wealth.

Many inquiries from investors, during the past two years, emphasize the necessity for a clear and concise statement, as to the location, extent and probable value of these deposits.

Very respectfully yours,

W. S. YEATES,
State Geologist.





THE GOLD DEPOSITS OF GEORGIA

CHAPTER I

THE OCCURRENCE AND HISTORY OF GOLD

BY S. W. MCCALLIE, ASSISTANT GEOLOGIST

GOLD, one of the most valuable of all metals, is nearly everywhere present ; but only in comparatively few places does it occur, in sufficient abundance, to be of economic importance. It is found in the recent, as well as in the older geological formations. The sea-water holds it in solution, and its presence has been detected even in common brick-clay.

If the nebular hypothesis be true, gold, like all other elements, was, at one time, during the early history of the earth, in a gaseous condition. A loss of heat, together with certain chemical changes, in process of time, caused many of these elements to assume a solid form ; and, at the same time, to arrange themselves into various groups and compounds, which now form the minerals of the earth's crust. Gold thus probably passed from a gaseous to a liquid state, before solidifying, in this way becoming pretty evenly dis-

tributed throughout the rock-mass. Cooling, drying, hardening, accompanied by extensive earth-movements, afterwards produced fissures and joints in the earth's crust. Through these crevices, the water circulated, carrying in solution various minerals, leached from the rocks, through which they circulated. A reduction of temperature and a decrease in pressure, as the water ascended, reduced the solubility of the gold and other minerals, held in solution, and caused them to be deposited along the walls of the fissures, thus forming auriferous veins. Such, in brief, is a condensed outline of the most probable theories, as to the origin of gold veins.

Gold occurs in a native state, and in chemical combination with tellurium. As a native mineral, it rarely exists in nature chemically pure ; but it is nearly always alloyed with more or less silver and other minerals. Native gold varies greatly in purity, ranging from 70 to 99 per cent. in fineness, and sometimes occurring even below 70 per cent. fine. The Australian gold averages 94 per cent. pure, while the California gold is only 88 per cent. The Georgia gold runs from 75 to 98 per cent. pure, a general average being somewhat higher than the California gold.

Gold most frequently occurs in minute particles disseminated through pyrite, quartz and other minerals ; but it is also sometimes found in masses of considerable size, called nuggets. One of the largest masses of native gold, so far reported, is the "Welcome" nugget, found many years ago in Victoria, Australia. It weighed 184 pounds, and was valued at \$40,470. Many other large masses of gold have been found in Australia, weighing from 50 to 190 pounds.

The largest lump of gold, found in the United States, was discovered on the Reed plantation in Cabarrus county, N. C., in 1799. It was about $8\frac{1}{2}$ inches long, 5 inches broad and an inch thick, and weighed 28 pounds avoirdupois. A number of nuggets have

also been found in California, the largest of which weighed 20 pounds.

There are numerous current reports of nuggets having been found, at different mines, in Georgia ; but none of them compare, in size, with the above. A nugget found at the White Path mine, Gilmer county, which was said to have weighed about $4\frac{1}{2}$ pounds, and was valued at \$1,100, is probably the largest mass of native gold ever found in the State.

The peculiar yellow color of gold, with its malleability and high specific gravity, must have attracted the attention of man, at an early date. These physical properties, together with its rarity, made it an object of great value among the ancients, who first used it, in making images of worship, and in decorating the persons of their royal chiefs ; and, later, as a medium of exchange.

Probably the oldest written account of gold, now extant, appears in the second chapter of Genesis, where it is spoken of, as occurring along the river Pison, a stream, which flowed from the Garden of Eden. Many allusions to gold occur in the Old Testament, from which it is learned, that it was extensively used, by the Jews, in adorning the robes of their priests, and in decorating their places of worship. The immense amount of gold, collected by this chosen people, for decorating Solomon's Temple, seems almost incredible. The precious metal, thus used, has been valued at \$250,000,000, a sum, greater, by nearly one half, than the present annual output of the world. Such an accumulation of gold indicates an acquaintance with rich gold deposits, and an extensive knowledge of mining. The source of this gold seems to be a mere question of conjecture. However, it has been recently asserted, with a considerable degree of confidence, by some of the best informed scientists, that it was obtained from the rich auriferous deposits, now being worked in South Africa.

The unearthing of golden vessels from the buried cities of Egypt, and the remains of ancient works in the gold-fields of Western Asia, show that the inhabitants of these countries were familiar with the precious metal, and mined it, more or less extensively, hundreds of years before the Christian era.

The following statistics and notes, collected from various sources, give a short, condensed review and history of the principal gold-producing countries of the world : —

GOLD PRODUCTION OF THE WORLD FOR 1895

EUROPE

Austria-Hungary	\$ 1,989,000
Germany	2,223,100
Great Britain	107,000
Italy	117,000
Russia	28,894,400
Sweden	52,500
Turkey	8,000

ASIA

British India	4,755,900
China	3,521,000
Japan	517,100
Korea	699,200

AFRICA

South Africa	42,993,869
The West Coast	1,550,250

AUSTRALASIA

Australasia	44,798,300
-------------------	------------

SOUTH AMERICA

Argentine Republic	95,000
Bolivia	67,000
Brazil	2,219,500
Chile	1,407,600
Colombia	2,892,800
Ecuador	68,400
Peru	63,800
Uruguay	27,200
Venezuela	909,500
Guiana (British)	2,213,100
Guiana (French)	2,605,200

NORTH AMERICA

Nicaragua	470,558
Mexico	6,000,000
Canada	
<i>Nova Scotia</i>	406,764
<i>Quebec</i>	1,281
<i>Ontario</i>	62,320
<i>The Northwest Territories and the Yukon District</i> ..	150,002
<i>British Columbia</i>	1,290,531
United States	
<i>Alabama</i>	4,635
<i>Alaska</i>	2,328,419
<i>Arizona</i>	1,871,618
<i>California</i>	15,334,317
<i>Colorado</i>	15,013,434
<i>Georgia</i>	127,942
<i>Idaho</i>	2,594,666
<i>Maryland</i>	499
<i>Michigan</i>	42,915

<i>Montana</i>	4,327,040
<i>Nevada</i>	1,780,204
<i>New Mexico</i>	943,050
<i>North Carolina</i>	68,476
<i>South Carolina</i>	127,819
<i>Oregon</i>	1,837,682
<i>South Dakota</i>	4,266,898
<i>Tennessee</i>	334
<i>Utah</i>	1,546,679
<i>Virginia</i>	6,303
<i>Washington</i>	373,148
Total for the United States	<u><u>\$52,596,429</u></u>

Russia. — The principal gold-producing country of Europe, at present, is Russia. The gold deposits of this country first attracted attention in 1726. The maximum output of the mines was reached, in 1825. Since then, with the exception of 1871-76, the annual production has been on the decrease. The gold is obtained mainly from placers, along the streams flowing from the Ural and Altai mountains. Besides the placer deposits, there has also been discovered, in these mountains, numerous valuable auriferous quartz veins, cutting the mica- and diorite-schists, at various angles. The veins are now attracting considerable attention; and they will probably soon become a source of revenue to the country. The lack of skilled labor, the severity of the climate, and the crudeness of the machinery, used in mining, have always greatly added to the expense of mining operations; and, at the same time, retarded, to a great extent, the development of prospects, which otherwise would be considered to be handsome investments.

Austria-Hungary. — The gold production of Austria-Hungary

comes mainly from Transylvania. There are also mines, operated at Příbram in Bohemia, and at Gastein in Salzburg. The mines in Transylvania have long been worked with profit; but they have now become partially exhausted, so that the future output will probably add no great amount to the world's production.

France. — In France, a limited amount of gold is produced, chiefly as a by-product, from auriferous galena ores. The country, in time past, has yielded a considerable amount of gold, from placer deposits; but these are now practically exhausted. The few auriferous veins, so far discovered, are usually small; and the ore is of too low grade, to be mined with profit.

Great Britain. — The gold deposits of Great Britain were known to the Romans; and they have been worked, irregularly, for several hundred years. The most profitable mining locality is in the mountainous part of Merionethshire, near Dolgelly. There has also been found, from time to time, a small amount of gold, associated with the tin ores of Cornwall.

Germany. — The gold-producing localities of Germany occur in Saxony, near Freiburg, and, also, in the Harz mountains. The mines belong to the government, and are said to be operated, frequently, at a loss. The gold usually occurs associated with silver ores, the chief output at present being derived from that source.

Italy. — The auriferous deposits of Italy were known and worked, quite extensively, by the Romans, prior to the Christian era. So productive were the mines of ancient Apulia, at one time, that the value of the precious metal is said to have been greatly decreased at Rome. The mines, now operated, are located in the Province of Piedmont, in the vicinity of Lake Maggiore, and in the Val d'Aosta. The ores are auriferous pyrites in schists, associated with copper and silver.

Sweden. — The principal gold-mining region of Sweden is found in

the Province of Svealand, in the vicinity of Fahlun. The gold occurs in auriferous quartz veins, associated with pyrite and copper ores. It is obtained, mainly, as a by-product, from the copper mines, which have been so profitable, in time, that the town of Fahlun has been termed "The Treasury of Sweden."

British India. — Gold mining in British India appears to be as old as its civilization. The remains of prehistoric works are found, in many of the provinces. It has been suggested by Pumpelly, that the gold-fields of India were the source of the fabulous wealth, accumulated by Cræsus. The early workings seem to have been confined almost entirely to placer-mining; and it is only within the last few years, that attention has been directed to vein-mining. Gold is found in many parts of British India; but the chief output, at present, is derived from the gold-fields of Mysore, near Colar. These deposits first attracted attention, in 1880. A number of companies have since been organized, and are now carrying on mining operations, on a large scale, with encouraging results. The most productive deposits of the Colar gold-fields are located in a grassy plain, about forty miles east of Bangalore. The gold appears in quartz veins, penetrating intrusive masses of diorite. The veins are usually small, but carry high-grade ore, which is free-milling.

China. — According to Pumpelly, who investigated the mineral resources of China, in 1862-5, gold is found, more or less abundant, in nearly all the various provinces. The principal output, for the last few years, has been derived, chiefly, from the extensive gold-fields, recently discovered in Manchuria. There are also mines of less importance in Korea, Yunnan and Kweichau. The gold-mining industry of China has been greatly retarded by governmental restrictions. It is thought, if the laws were more lenient toward the miners, the output of the empire would materially affect the gold production of the world.

Japan. — Japan has many gold mines, some of which have been worked, for centuries. The most noted mines are those situated on Sado Island, 50 miles north of the city of Niigata. The early workings, on the island, were confined to rich placers, along the various streams. The alluvial deposits are now practically exhausted; and attention is being directed to vein-mining. At present, four different lodes are being worked, on the island. The lodes are frequently 30 feet or more, in width; and, in places, they have been worked, to the depth of 900 feet. Associated with the gold, is silver, copper and lead ore, forming the gangue of the auriferous deposits.

South Africa. — The recent exploration of the gold-fields of South Africa, by John Hays Hammond and others, show, that the auriferous deposits were known and worked, by the ancient inhabitants of the country, many centuries ago. These explorers give an account of numerous old workings, in Mashonaland and Matabeleland, extending along the outcropping of the different reefs, for more than 300 miles. The work consists of open cuts, from 25 to 50 feet deep, and frequently several hundred yards in length. The excavations, made by Theodore Bent, a few years ago, in exploring the ruins of the ancient cities of Zimbabwe, in Mashonaland, disclosed the remains of numerous furnaces, crucibles and casting-moulds, the handiwork of some prehistoric race, familiar with gold and the various modes of extracting it from the ores. The recent gold excitement of South Africa may be said to have commenced in 1868. During this year, the first London company was organized; and it began mining operations in the Tati river, a gold district in the southeastern part of Matabeleland, near the Transvaal boundary. Previous to this date, even as early as 1854, gold was discovered at various places, in the Transvaal, by the Boers and foreign travellers; but, as gold mining was prohibited by law, the discovery attracted but little attention. The London company, although it proved a financial failure, seems

to have greatly stimulated prospecting, which soon led to important discoveries, and finally to the development of the most noted gold deposits in the world. The principal mining centres of the South African Republic, at present, are the rich gold-fields of Witwatersrand, DeKaap, Lydenburg, Klerksdrop, Potschefstroom, Zoutpansberg and Malmani. These deposits are all of great extent; and, if current reports are to be relied upon, they will, in a few years, greatly increase the annual gold production of the world. Dr. George F. Becker, of the U. S. Geological Survey, who has recently returned from the gold-fields of South Africa, says, that the Transvaal Republic contains the greatest gold deposits in the world. He states that, within fifteen miles of Johannesburg, which is the center of the Witwatersrand gold-fields, there is now an amount of gold, practically in sight, on what is called the main reef, estimated to be worth \$3,500,000,000, or, nearly as much as the entire volume of gold coin, now in existence. The present rate of output from these various gold-fields is nearly \$100,000,000 per annum; yet, at this rate of mining, it would require more than half a century, to exhaust the auriferous deposits, now in sight. The gold-bearing reefs in the vicinity of Johannesburg, and also in many other gold-mining districts, in the southern part of the Transvaal, occur in beds of conglomerate, interstratified with sandstone. These auriferous beds vary, from 1 to 20 feet in thickness, and carry ore, milling from \$10 to \$50 per ton. The deposits in the northern part of the Transvaal, and also in Mashonaland and Matabeleland, are said to be found in fissure veins, in zones of schists enclosed in granite.

The Western Coast. — Gold has long been known, to occur, in more or less abundance, in Western Africa, especially along the Gold Coast; but, owing to the unhealthy condition of the climate, the auriferous deposits have never been thoroughly investigated. Mr. Hesketh J. Bell, Asst. Treasurer of the Gold Coast, in a paper,

read May 1st, 1893, before the Liverpool Chamber of Commerce, says:—

“If the Gold Coast possessed a climate, no worse than that of Australia or South Africa, the question would, long ere this, have solved itself; and a rush to the West Africa gold-fields would have happened very many years ago.” So common is gold among the natives, that it is said, that no family, in the country, is without its ornaments of the purest gold. The most noted auriferous deposits, now being worked on the Gold Coast, are located in Warsaw. This gold-field, which is situated many miles inland, is at present being developed by a number of English companies, who have experienced great difficulty, in opening up the mines, on account of the unhealthfulness of the climate, and the bad condition of the road, over which machinery has to be transported. The gold occurs in alluvial deposits, and in quartz veins, in gneiss and mica-schist.

Australia.—The first discovery of gold in Australia, was made, in 1823, by James O'Brian, a surveyor; but it was not until 1851, that the importance of the gold-fields was made generally known to the civilized world. It was during this year, that E. Hammond Hargraves, an English miner, on his return from California, found gold at Lewis Ponds, and Summer Hill creek, in the Bathurst and Wellington Districts, about 100 miles west of Sydney. Immediately following the announcement of this discovery, there was a great rush to the Australian gold-fields, from both America and Europe; and, in a comparatively short time, there were thousands of miners, busily engaged, in washing gold from the alluvial deposits, along the various streams. From these deposits alone, there was produced, during the first year, nearly one and a half million dollars worth of gold. Other discoveries soon followed, in rapid succession, not only in New South Wales, but also in Victoria, Queensland, West Australia, Tasmania and South Australia, and in New Zealand. The gold-fields of Australia

cover thousands of square miles; and are gradually being extended from year to year, by new discoveries. The chief output of gold, at present, is mainly derived from the rich gold-fields of Queensland and Victoria. These fields formerly yielded large quantities of gold, from the alluvial deposits; but they are now partly exhausted; and the principal supply is being derived, at present, from the quartz mines. The placer deposits occur along streams, and in ancient river-beds, which are often overlain by thick beds of basalt. These alluvial deposits are frequently quite rich, and often yield numerous nuggets, some of which have been found, weighing more than 2,000 ounces, and valued at \$40,000. The auriferous quartz veins, occurring in gneiss and granite, vary in width, from a foot to many rods in thickness, and sometimes carry ore, running several hundred dollars per ton. The general average, however, is from \$10 to \$20 per ton. The veins are said to run, generally, parallel with the bedding of the country-rock, and, occasionally, to become greatly enlarged into pockets, carrying many tons of high-grade ore.

South America. — The gold deposits of South America have been known to the Europeans, ever since the country was first discovered; and, up to the opening of the California mines, they produced a great part of the world's production of the yellow metal. The first mines were opened, by the Spaniards in Colombia, in 1537. Since then, rich gold-fields have been found, in all the different political divisions. The mines of Brazil, Colombia and British Guiana are, at present, the most productive. The Brazilian deposits were discovered, as early as 1577; but they were not worked, to any extent, for more than a century, afterwards. The early workings were confined chiefly to the alluvial deposits along the various streams, in the Province of Minas Geraes. These placer deposits are now partially exhausted, and the principal output is, at present, derived from quartz mining. The gold, which is frequently alloyed with

silver and copper, and also, sometimes, with platinum and palladium, occurs generally in quartz veins, penetrating mica-schists, slates and itacolumite. It is also sometimes found disseminated throughout the rock-mass, which forms large bodies of low-grade ore.

The auriferous deposits of Colombia have been worked, continuously, since 1537; and, prior to the discovery of gold in California and Australia, they were the most productive fields in the world. Three-fourths of the present output of the mines is now derived from the alluvial deposits, the most noted of which are located in the Department of Antioquia, a mountainous region, near the centre of the republic. All the political divisions, lying along the Pacific coast, are said to have rich placers; but, owing to the scarcity of water, many of them are practically unproductive. Numerous gold-bearing lodes have been discovered, in the Departments of Antioquia and Cauca, some of which are now being worked with profit.

British Guiana. — The gold-mining industry of British Guiana, which first attracted attention in 1884, has gradually increased in importance, from year to year, until it has become one of the leading industries of the colony. The most productive mines are those located on the Potoro river, about 150 miles from Georgetown. There are also other valuable alluvial deposits along Cuyuni, Mazaruni and Demerara rivers, all of which are now being worked. The deposits occur, in heavily wooded lowlands along the rivers, and are frequently difficult to work, on account of insufficient drainage, and the heavy growth of vegetation, which has to be removed. The mining regions are hot and unhealthy. The work is chiefly done by negro laborers, brought from the coast. A number of gold-bearing veins have been discovered, in several of the mining districts; but they have not yet been worked, to any extent, as the placer deposits offer more profitable returns.

Nicaragua. — The auriferous deposits of Nicaragua extend along the Coco river, near the Honduras boundary, and also along the eastern shore of Lake Nicaragua. The mines have been worked, since the early explorations of the Spaniards. Many of them are said to be rich in gold; but the crude and unscientific mode of mining greatly reduces their profits. Some of the gold-belts have been only partially explored, and are thought to offer inviting fields for prospectors.

Mexico. — Mexico has but few paying gold mines, although it yields quite an output of the yellow metal. The source of the gold is mainly the auriferous silver ore, from which it is obtained as a by-product.

Canada. — The principal gold-producing fields of Canada are located in Nova Scotia and British Columbia. The deposits of Nova Scotia were discovered in 1861; and they have since yielded a small, but constant, output. The gold-belt, which has a maximum width of 30 miles, extends parallel with the eastern coast of the peninsular, from Canso to Yarmouth, a distance of nearly 200 miles. The gold occurs in quartz veins, which mostly run parallel with the sandstone and quartzite, which constitute the country-rock. These veins are said to vary, from a few inches to several feet, in width, and can frequently be followed, for long distances, along their outcrops. Associated with the gold ores are zinc blende, pyrite, galena, chalcopyrite and iron-oxide.

British Columbia. — The chief gold-mining region of British Columbia is located along the Frazier and Columbia rivers and their tributaries, between the Rocky mountains and the Coast Range. The first discovery of the precious metal, in this province, was made in 1859, on the Frazier river, near Necoamen. The mining operations have been confined chiefly to the alluvial deposits along the streams. The most valuable deposits, so far discovered, are located

in the Cariboo district, a mining region on the headwaters of the Frazier river. The rich deposits found here occur in ancient river-channels, frequently 100 feet or more beneath the beds of the present streams.

The placer mines on the Leech river, on Vancouver's Island, for a time, yielded quite an output of gold, and gave promise of a bright future ; but the works are now abandoned.

UNITED STATES. — The various gold-fields of the United States may be divided, for convenience of description, into three separate divisions, viz: — The Pacific division, the Rocky Mountain division and the Appalachian division. The Pacific division embraces all the auriferous deposits, found in California, Arizona, Utah, Idaho, Nevada, Oregon, Washington and Alaska.

California. — The first discovery of the precious metal, on the Pacific Coast, was made, on the South fork of the American river, near Coloma, about forty miles southwest of Sacramento City, in the spring of 1848. The discovery was accidentally made, by a party of workmen, while making an excavation for a mill-race. An investigation of the alluvial deposits along the stream quickly followed, and revealed an extensive placer, remarkably rich in gold. The news of this important find was soon made known, through the daily press, and fortune-seekers, in great numbers, flocked to the new gold-fields. New discoveries followed each other, in rapid succession ; and, in a comparatively short time, California became the most noted gold-producing country in the world. So profitable were these early workings, that a common miner, with shovel and pan, made from 10 to 20 dollars per day ; and, in some instances, as much as \$1,000 per day has been credited to one miner.

The gold-fields of California are found along the western slope of the Sierra Nevada mountains, running parallel with the Pacific

coast. The total length of the belt is nearly 700 miles, and its width varies from 20 to 60 miles.

Oregon and Washington. — The auriferous deposits of Oregon and Washington are similar to those of California. The output of the yellow metal, from these States, has never attained very large proportions. However, they have many mines, both of quartz and of alluvial deposits, paying profitable dividends.

Nevada, which is noted mainly for its rich silver mines, has also produced large quantities of gold, chiefly as a by-product from the argentiferous ores. The most celebrated mines in the State are located, on what has been termed the Comstock Lode in Storey county, a few miles northeast of Carson City. This lode was discovered in 1859; and it has since been extensively worked, yielding immense quantities of both gold and silver. The mines are noted for the large size and richness of the ore-bodies; the great depth of the works; and the high temperature of the rocks in the lower levels. The lode is a fissure vein, four miles long, with a width varying, from 20 to 60 feet. The vein material consists of crushed quartz and decomposed country-rock, with more or less pyrite, calcite and gypsum. The high-grade ore occurs in ore-bodies called "bonanzas," at irregular intervals along the vein. The total output of the different mines on the lode has been estimated, at \$400,000,000, two-fifths of it being gold, and the remainder, silver. The greatest depth, attained in the mine, is more than 3,000 feet, while the aggregate length of the shafts and galleries exceeds 150 miles. The heat in the lower levels of the mines is so intense, as to greatly interfere with mining, the temperature increasing at the rate of 1° for every 34 feet of descent.

Alaska. — As a gold-producing country, Alaska is rapidly pushing itself to the front, regardless of the many difficulties, encountered by the miners. Attention was first directed to the auriferous de-

posits, as early as 1876. During this year, the first important mine was **located**, near the mouth of Stikeen river, in the southern part of **the territory**, 75 miles southeast of Sitka. Further discoveries were soon made, on the various islands along the coast, as far north as **Glacier Strait**. Some of these prospects have, since, developed into profitable mines, notably those situated on Douglas Island, near Juneau City. The mines of this island produce, annually, chiefly from quartz veins, more than one half of the entire output of the territory. The ore-bodies occur, in huge dikes or granite bosses, penetrating the Triassic slates. They have been worked in places, to the depth of 500 feet, with but little change in their metalliferous contents. The rich alluvial deposits, recently discovered in the Yukon Valley, are at present attracting considerable attention, and are thought to be of great extent and of unusual richness. The first important placer diggings, in the gold-field was carried on, along Forty Mile Creek, only a short distance from the Canadian border. These deposits are now partly exhausted; but other rich placers are reported, further to the northeast, on the numerous tributaries of the Yukon and Tanana rivers. Mr. J. E. Spurr, of the U. S. Geological Survey, who has just returned from an exploring expedition of the Yukon Valley gold-fields, is reported, through the daily press, as giving an encouraging account of the auriferous deposits. The severity of the climate and the scarcity of food, in the gold district, make mining extremely expensive, so that only the richer parts of the placers can be worked with profit.

The Rocky Mountain Division comprises Colorado, Montana and New Mexico. Colorado is the most important gold-producing State of this division, ranking second to California, in the production of the yellow metal. South Dakota and Montana each have many valuable and productive mines; but neither has yet attained much importance as a gold-producing State.

The Pike's peak gold excitement, which took place in 1859, may be regarded, as the beginning of the gold mining, in Colorado. During the same year, the rich placer deposits of Gilpin county were made known. These discoveries were followed by the usual rush of prospectors, who explored the eastern slopes and foot-hills of the Rocky Mountains, and located, at various places, valuable mines, which have since produced large quantities of gold. One of the most important of these discoveries, and the last to attract wide-spread public attention, was the location of the rich lode in the Cripple Creek district. The first important find in this district was made, in 1891. Previous to this date; there was carried on, from time to time, considerable prospecting, in the locality; but no discoveries, of any note, appear to have been reported. The Cripple Creek mining camp is located some fifty miles southwest of Colorado Springs, near the western base of Pike's Peak, on a small tributary of the Arkansas river. Topographically, the district is made up, of many rounded hills, with numerous small valleys and gulches. The productive area, which is being gradually enlarged, from time to time, by the location of new prospects, is about six miles long and three miles wide. The entire area is overlaid, by a brecciated rock, of igneous origin, frequently penetrated by dikes, which are the chief ore-carriers. The dikes appear to have been shattered and fissured, by some dynamical force, and, afterward, to have been impregnated with gold and various other associated minerals. The ore-bodies often occur in the form of chimneys or ore-chutes, separated by wide intervals of barren rock. They vary, in thickness, from a few inches to several feet, and, in places, seem to extend to great depth. The larger portion of the gold, now mined at the camp, occurs, in the form of a telluride, associated with pyrite, fluorite and manganese- and iron-oxides. Free gold is also abundant in places, near the surface, where the ore-bodies have become oxidized. The ore is usually of a

high grade, running from twenty to several hundred dollars per ton. The average yield per ton, from the various mines, during the month of September, is reported to have been over \$50. Since the completion of the railroad to the camp, much of the ore is being shipped to Denver and Pueblo, where large smelters have been erected.

The Appalachian Division. — The Appalachian gold-fields comprise numerous auriferous deposits, forming a more or less continuous belt, extending from Maine to Alabama. It is only the southern part of the belt, traversing Virginia, the Carolinas, Georgia and Alabama, that has attained any very great economic importance. The belt, which consists of highly metamorphic rocks of unknown age, varies from 10 to 75 miles, in width. In places, it is made up of several minor belts, running parallel with each other, which have been named, from some well known mine or mountain, along their course. The numerous streams, intersecting these belts, flow over beds of auriferous gravel. In many places, these alluvial deposits were formerly quite rich in gold; but they have now become practically exhausted, and attention is, at present, being directed to vein-mining. The ore-bodies, which have fed the streams, consist generally of zones of schists and other metamorphic rocks, interlaminated with numerous quartz stringers, forming belts, frequently many rods wide, and miles in length. The gold is chiefly found in the quartz, though it also occurs, in places, disseminated throughout the schists. Quartz veins, of considerable size, carrying auriferous pyrite, and cutting the schists at various angles, are also occasionally met with. Such veins often become greatly enlarged into huge chimneys or chutes, carrying large quantities of high-grade ore.

The exact date of the discovery of gold in the Appalachian gold-fields, by the whites, appears to be a mere question of conjecture.

That the yellow metal was known to the Indians, and used by them, to a certain extent, for personal adornment, is a well-known fact. However, there appears to be but little evidence, that they carried on mining operations, to any extent. Probably the oldest written account, of the occurrence of gold in the Southern States, appears in the *Chronicles of America*, by Herrera. This historian states, that Ponce De Leon, in his search for the fountain of perpetual youth, along the coast of Florida, in 1513, was informed by the natives, that an Indian chief, in the neighborhood, possessed large quantities of gold. As the aborigines knew but little of metals, it has been suggested, that this statement most likely referred to copper, mica, or some other mineral in more general use.

Three years after the explorations of Ponce De Leon, Diego Mirelo, a fearless Spanish sea-captain, touched on the coast of Florida, and, in trading with the Indians, obtained a small amount of gold. This seems to be the first conclusive evidence, of the occurrence of gold in the Southern States.

In 1528, Pamphilo de Narvaez, who had been appointed Governor of Florida, by the Spanish Crown, arrived at Tampa Bay, with a large armed force, for the purpose of subduing the country of the supposed Montezumas. No sooner had the expedition landed and taken up their march into the interior, than the Indians, who were anxious to rid themselves of the cruel invaders, exhibited numerous trinkets, made of gold, and, at the same time, pointed northward, where they reported the yellow metal to be found, in great abundance, in the Apalachen country. The Spanish general, stimulated by the sight of gold, pushed forward; and, after many weeks of toil and hardship, traversing the swamps of Western Florida, he at last arrived at a miserable Indian village, of forty small cabins. This, he was told, by his guides, was Apalacha; but a diligent search, in the surrounding country, revealed no gold.

Bryant, the historian, is of the opinion, that the Indians, in speaking of Apalachen, had reference to the country, at the source of a river, rising in the Appalachian mountains of Georgia, and not to the village at its mouth, as understood by the Spaniards. If **Bryant's** interpretation be correct, this is the first mention of gold, within the limits of the State of Georgia. The expedition of **De Narvaez** proved a signal failure. He found, in his various wanderings, neither gold in abundance nor wealthy princes; yet, regardless of the unfavorable reports of the survivors of the unfortunate expedition, but little effect seemed to have been produced, in dispelling the current belief, that there existed somewhere, in the newly discovered country, rich empires, with numerous palaces and temples, gorgeously decorated with gold and precious stones.

Shortly after the return of the four remaining survivors of **Narvaez's** expedition, **DeSoto**, a noted Cavalier and companion of **Pizarro**, fitted out a second expedition, for the purpose of exploring and conquering Florida. This armed force, which consisted of more than 600 trained soldiers, landed at Tampa Bay, in June, 1539, and, at once, struck boldly into the interior, in quest of riches and fame. For more than three years, the Spaniards traversed the Southern States; but nowhere were they able to find riches, in sufficient abundance, to satisfy their avaricious desires. It was during this expedition, that the Spaniards are supposed, by some writers, to have traversed the gold-fields of North Georgia, and carried on mining, to a limited extent, in that region.

Dr. Chas. C. Jones, in his history of Georgia, in speaking of the expedition, says: — "Five days were occupied, in passing from this province to Xualla. The chief town of this last-named province bore the same name; and it was located on the flanks of a mountain, with a small, but rapid, river flowing near. We venture the suggestion, that this village was situated in Nacoo-

chee Valley,¹ Habersham county, and that the mountain, referred to, was Yonah. In the valley, physical proofs of primitive occupancy are still extant, and metallic fragments of European manufacture have been found, confirmatory of the fact, that, many years prior to the settlement of this region by the whites, it had been visited by kindred peoples." The same author, in another part of the work, makes the following statements: — "In recalling the existence of temporary occupancy, by Europeans, of limited portions of the territory, at a later period, conveyed to the trustees, for establishing the colony of Georgia, it is proper, that we should allude to mining operations, conducted by the Spaniards, at an early epoch, among the auriferous mountains of upper Georgia. Influenced by the representations, made by the returned soldiers of De Soto's expedition, of the quantity of gold, silver and pearls, existing in the province of Cosa, Luis de Velasco dispatched his general, Tristan de Luna, to open communication with Cosa, by the way of Pensacola Bay. Three hundred Spanish soldiers of this expedition, equipped with mining tools penetrated to the valley of Coosa, and passed the summer of 1560 in northern Georgia and the adjacent region." Other instances are sighted by the author, as a proof of early mining in North Georgia, by the Spaniards. Many of these accounts and traditions seem to be quite plausible. Nevertheless, it is hardly probable, that the Spaniards would have abandoned mines, which were afterwards found to be so profitable, as those in North Georgia. Leaving out the various reports of the Spaniards, the first authenticated account, of the occurrence of gold in the Southern States, appears in Jefferson's notes on Virginia, published in 1872. He, therein, speaks of a piece of ore, found a short distance below the falls of the Rappahannock river, weighing four pounds, and containing 17 pwts. of gold. Eleven years after the publication of Jeffer-

¹ Now, a part of White county.

son's notes (1799), a nugget, weighing 17 pounds, was discovered on the Reed plantation in Cabarrus county, N. C. The true nature of this nugget was not made known, until some years afterwards, when further search revealed a number of other nuggets, one of which is reported to have weighed 28 pounds. After the discovery of gold on the Reed plantation, North Carolina became a regular producer, and yielded all the native gold, coined in the United States, until 1827, the total amount being about \$110,000. In 1829, South Carolina made the first deposit at the mint. During the same year, gold was discovered in Georgia.

The first discovery of gold, in Alabama, was probably in 1830; and, in the following year, the placer deposits on Coco creek, Tennessee, were made known. Gold is reported to have been found in Maryland, as early as 1849; but the U. S. Mint shows no return, from this State, until 1868.

Georgia. — In White's Statistics of Georgia, published in 1849, occurs the following statement, with reference to gold in Georgia: — "The first discovery of gold in the State was made on Duke's creek, Habersham county,¹ in 1829. The mass weighed three ounces." It is currently reported, and generally believed, in Lumpkin county, that the first discovery of gold in the State was made, some months previous to the above date, on the Calhoun property, three miles south of Dahlonega. This early discovery is substantiated, by living witnesses; but, whether or not it antedates the Duke's creek find, is an open question. It appears quite probable, that the first discoveries succeeded each other, in such rapid succession, that it is now practically impossible, to decide, definitely, the question of priority. However, at present, the most reliable information seems to be in favor of Duke's creek.

Only a few months after the announcement of the occurrence of

¹ This part of Habersham county is now White county.

gold in North Georgia, hundreds of miners were busily engaged on various streams, throughout the section, in search of the yellow metal. Governor Gilmer, in a letter, dated May 6th, 1830, addressed to John McPherson Berrian, then Attorney General of the United States, says: — "I am in doubt, as to what ought to be done with the gold-diggers. They, with their various attendants, foragers and suppliers, make up between six and ten thousand persons. They occupy the country between the Chestatee and Etowah rivers, near the mountains, gold being found in the greatest quantity, deposited in the small streams, which flow into those rivers." In June of the following year, Governor Gilmer issued a proclamation, prohibiting gold mining in North Georgia, which was then known as the Cherokee Country. An armed force, sent into the territory, to enforce this proclamation, retarded, for a time, to a great extent, the mining industry of the region; but the desire for gold, was by no means lessened, by such a prohibition; and many of the miners were able to evade the law, and obtain gold, regardless of the watchful eye of the soldiery. It was during this year, that the first deposit of gold from Georgia, amounting to \$212,000 was made at the U. S. Mint. The most active mining region, at the time, was in Lumpkin county, in the vicinity of Dahlonega. So important had these gold-fields become, that the U. S. Government established a branch mint here, in 1838. The mint continued in operation, until 1861, and coined 1,381,784 pieces, valued at \$6,115,569. The report of the U. S. Treasury Department shows the following annual coinage, from the Dahlonega Mint: —

1838	-----	\$102,915.00
1839	-----	128,880.00
1840	-----	123,310.00
1841	-----	162,885.00

1842	309,647.50
1843	582,782.50
1844	488,240.00
1845	501,295.00
1846	449,272.50
1847	361,485.00
1848	271,752.50
1849	244,130.50
1850	258,502.00
1851	351,592.00
1852	473,815.00
1853	462,918.00
1854	292,760.00
1855	116,778.50
1856	102,575.00
1857	32,906.00
1858	100,167.00
1859	65,582.00
1860	69,477.00
1861	60,946.00
Total	\$6,115,569.00

It is reported, by a number of reliable citizens, who were familiar with the early mining industry of North Georgia, during the establishment of the Dahlonega Mint, that a considerable part of the gold, mined in Georgia, was sent to the Philadelphia and other mints, so that the annual output, for that State, was really greater, than that reported in the foregoing table.

The total production of gold and silver from Georgia, since the early discoveries, until the present, has been estimated to be as follows: —

OCCURRENCE AND HISTORY

1799-1879	\$14,180,500
1880	120,000
1881	125,000
1882	250,000
1883	200,000
1884	137,000
1885	136,000
1886	153,500
1887	110,500
1888	104,500
1889	108,069
1890	101,318
1891	80,622
1892	95,251
1893	100,375
1894	99,095
1895	127,942
Total	\$16,228,730

The approximate amount of silver, produced during this time, was \$7,000, which, deducted from the above total, gives \$16,221,730, the amount of gold produced.

The greatest annual output, from the State, occurred in 1843, when the total yield of the various mines, then in operation, was \$582,782.50. Since the above date, the output has greatly fluctuated, from year to year. However, the total yield has gradually decreased, until the last two years. This gradual reduction has been due, mainly, to the exhaustion of the placer mines, the source, from which the greater part of the Georgia gold has been derived. As deep mining and the economic working of refractory ores are now being introduced, with satisfactory results, the future outlook for the Georgia gold-fields is, at present, quite promising, and will, no doubt, in a few years, again reach their former productiveness.





CHAPTER II

WHITE COUNTY

BY FRANCIS P. KING, ASSISTANT GEOLOGIST

"The Dahlonega Gold Belt" extends through the entire county of White ; and, as far as known, its richest depositions are to be found in the two counties, Lumpkin and White. The early renown of the Dahlonega district, the establishment there of extensive and expensive plants, and the wide distribution of its mining stock has, up to the past few years, diverted attention from this equally important section of the belt. Lately, however, more interest has been concentrated on this county. Suitable plants are taking the place of old and crude equipments, and there has asserted itself here a tendency, gradual but decided, toward advanced methods in mining both vein and gravel deposits. The results of this continued advancement will soon speak for themselves ; yet it may be safely prophesied, that they will, in a brief time, place White county at least close to the head of the gold-producing counties in Georgia.

The earliest discovery of gold in this county, and probably in Georgia, was in 1828, by a negro servant of Major Logan, of Loudsville, Ga. While on his way from Rutherford, N. C., where gold mines had just been opened, he was attracted by the similar appearance of the soil along Nacoochee river, tested it in a "boiler," and found gold. This discovery was made in a branch on the Lovelady place. At this time, the Cherokee Indians had left the Nacoochee and Loudsville valleys, and were beyond the Chestatee,

to the west. The lands they left in this region had been surveyed into two hundred and fifty acre lots, and sold to settlers. It is presumed, that the Cherokees did not know of the existence of gold, in this region, up to the time of this discovery, although housewife fabulous tales of their discoveries are current.

There seems to have been little system to the mining, in these early days of gold discovery, and even on, up to the war. The settlers worked singly and in small gangs, at odd times during the year, and jumped from place to place, as new discoveries were reported. Yet, in 1860, C. L. Williams, a merchant at Nacoochee, Ga., who purchased much of the gold produced in that region, writes: — "I have been in business here, for thirty years, and, for most of that time, agent for some one of the banks (in Charleston), and, during that time, have bought between two and three million dwts. of gold." Most of this was taken from the stream deposits in the vicinity.

Following the war, we find water aqueducts constructed, and generally improved conditions of mining, especially in the Nacoochee district. Progressive development in the past, nevertheless, has been retarded in a great measure, by iniquitous lawsuits and damage claims. I am glad to say, that that class of citizens, who would profit by, or retard the prosperity of, their neighbors, is rapidly being pushed into the background, by the better element and new blood.

The belt of auriferous deposit extends northeast, through the county, from corner to corner, its average width being from two and a half to three miles. Throughout its entire extent, it is rich in gold-bearing veins and saprolite;¹ and the stream traversing it have yielded magnificent returns. Practically, little attention has been given to the first, and their development remains to the future. Besides the vein and gravel deposits, the northeastern portion of

¹ The term "Saprolite," is used by Becker, "to signify thoroughly decomposed rock, in place," *Reconnaissance of the Gold Fields of the Southern Appalachians*, by George F. Becker, pp. 38 and 43. Extract from the Sixteenth Annual Report of the Director of the U. S. Geological Survey, Part II.

the Belt, especially, has extensive saprolite areas, untouched and most inviting.

The rocks of the belt are gneisses, mica-schists and hornblendic schists. The transition from one to the other of these rocks is generally so gradual, as to be unnoticeable, except in the case of the hornblendic schists, which most frequently show decidedly sharp transition phases, presenting the appearance of dikes. The average strike of these schists is N. 30° E., with a universal dip to the southeast, although exceptional instances are to be found locally.

The present mining interest of the belt, despite its universal richness, is centered in the Nacoochee district. This is one of the most picturesque regions of North Georgia. It is not only prominent for its scenic beauty and fertility of soil, but for its Indian traditions. Nacoochee, meaning "Evening Star," is said to have been the name of a Cherokee maiden, daughter of the local chief, famous for her beauty. Fleeing with her lover from a hostile father, says tradition, they escaped to Yonah mountain; and here, hard pressed, in preference to separation and torture, they leaped together into oblivion from its frightful precipice. They were buried together in a mound at the junction of the Chattahoochee and Nacoochee rivers. A solitary pine marks the grave.

Broad meadows border the Chattahoochee, and, on either side, rise the broken spurs of the Blue Ridge. The Nacoochee river, now known as Duke's creek, enters the Chattahoochee at the lower end of the valley, after flowing in a parallel course with it, through an adjoining valley, Hamby mountain intervening. On the south, towers Yonah mountain, a gneissic mass, with an elevation of 3,025 feet above sea-level; on the north, the long line of the Blue Ridge, usually haze-covered, but ever changeful in its foliage effects and magnificent contouring.

THE LUMSDEN PROPERTY¹

"LOT 10"

This property is located about two miles north of Nacoochee valley, and lies in the *3rd district* of White county. The lots, 250 acres each, which it embraces, are *10, 11, 21, 22, 23 and 44*. It is best known among the miners and residents of northeast Georgia as "Lot 10"; and, as a gold-bearing property, it stands in good repute among these people. More or less widely known, since the discovery of gold in its streams, it has recently attracted considerable attention, since the opening up on it of a zone of gold-bearing material.

The first authentic discovery of gold on this property was in 1830. It was then worked by Horshaw, Reynolds and others, by means of "long toms," "rockers" etc. Diamonds are said to have been found here, during the first workings.

Lately, the work has been carried on by Mr. J. R. Lumsden and others. Placer-work, however, has ceased almost entirely; and now attention is confined strictly to the gold-bearing slate, which is worked by tributers, using a combination of hydraulic and dry mining. The hard ore is hauled a quarter of a mile to a wooden ten-stamp mill, driven by a twenty-foot overshot water-wheel.

The country in this region is quite broken, some of the hills having an elevation of four hundred feet. It is drained by Bean creek and tributary branches. Along these water-courses, considerable gold has been washed out, since its discovery. Although much of the placer areas has been worked over once, at least, and,

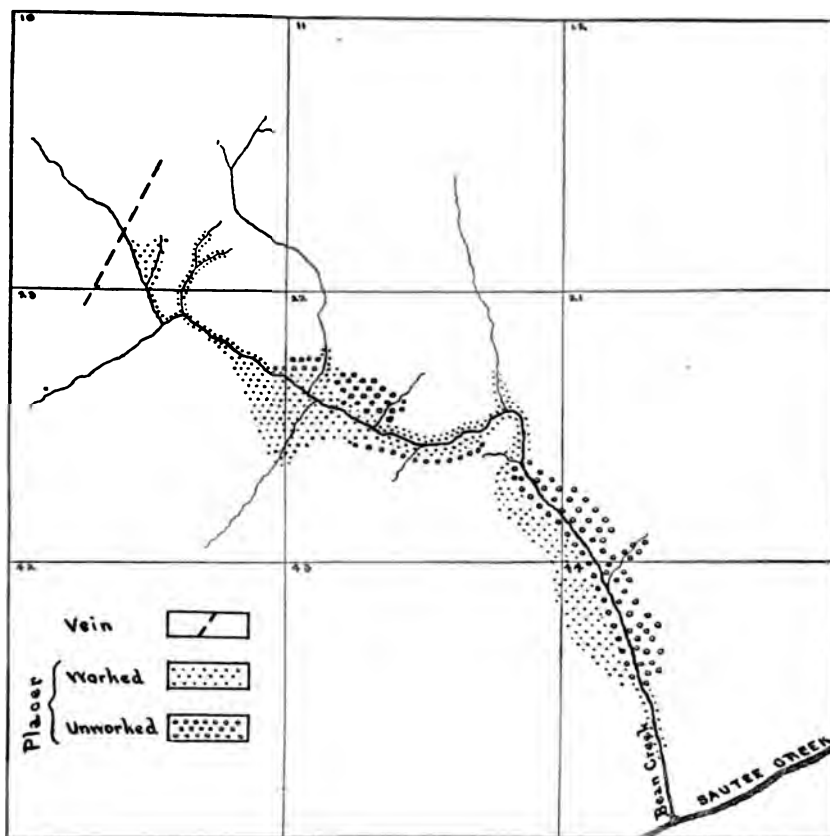
¹ From field-notes of S. W. McCallie, Assistant Geologist.

in **richer** and more accessible portions, several times, there still remains considerable virgin territory. The bottoms, or placer areas, of **Bean** creek and its branches have been worked, on either side, to **a** width, varying from fifty feet to four hundred yards. **Bean** creek, from the stamp-mill to Sautee creek, has only a moderate fall — in a distance of over one mile and a half, probably not over **twenty-five** feet. This slight fall, therefore, has seriously interfered with the working of the bottoms below the mill, to such an extent, that there are possibly fifty acres of auriferous gravel, which have **never** been touched by miners. Besides this area, much of the **old** placer areas could be re-worked profitably, by devising a suitable system of drainage. The sketch-map of this property, which accompanies this report, will serve to show the worked and workable areas.

Geologically considered, this property is made up of gneisses and mica-schists. These grade into each other, and strike about N. 20° E. The dip varies; but it is usually sharp and invariably to the northwest. A gold-bearing zone, in this formation, has been discovered, near the south line of lot 10, close to **Bean** creek; and it is here, that the principal work is now being conducted. This auriferous zone or belt is over two hundred feet in width, and consists of garnetiferous hornblende-gneiss, frequently traversed with extremely thin dikes of hornblende, and innumerable quartz stringers and lenticular pockets, conformable with the gneiss. Weathering has so completely broken and shattered the rock to some depth, that blasting is unnecessary, and the entire mining of the gold can be carried on by hydraulicking and dry mining. The apparent auriferous material of this zone are the quartz stringers and quartz nodules. Garnets, however, which are quite abundant, are frequently shown to contain some gold, when crushed and panned.

The present proprietors' lack of funds has prevented them from supplying a proper equipment for the carrying on of their work to the best advantage; yet, with the crude means at hand, they state, that five men are able to extract from 70 to 80 dwts. per week.

Fig. 1.



Sketch-Map of the Lumsden Gold Lots.

Five samples of ore were taken for assay at the same number of openings, along this zone. These assayed, in the laboratory of the Survey, as follows: —

Sample No. 1	.	.	0.175 oz.	—	\$3.50 per ton.
"	"	2	.	.	0.050 " — 1.00 " "
"	"	3	.	.	0.125 " — 2.50 " "
"	"	4	.	.	0.130 " — 2.60 " "
"	"	5	.	.	0.125 " — 2.50 " "

THE JARRET PROPERTY

This property is more generally known as the "Childs mine." It lies to the southwest of lot 10, on lot 24, 3rd district, White county. Mr. Childs of Athens, Ga., operated here, for some time; but, for the past seven or eight years, no work of any duration has been done.

What has been already stated, in regard to the natural features of the Lumsden property, holds true here. The geological formation is the same. The gold-bearing material, worked upon, is but a continuation of the quartz "stringer" auriferous zone, now being operated by the Lumsden people, a quarter of a mile to the northeast. Mr. Childs did his work, by hydraulicking and dry mining. The excavated material was sluiced some distance, through a long line of riffle-boxes, to a twenty-stamp mill, where the coarse and hard material was finally worked up. This work covered a considerable period of time, and an immense amount of auriferous matter was thus treated. About eight years ago, Mr. Childs ceased work. We are not able to give an estimate of his profits, as we have only rumor to guide us, and this is variable.

THE PLATTSBURGH PROPERTY¹

The Plattsburgh property consists of the northeastern quarter of lot 40, 3rd district, and has been locally known for some years as "The England Mine." In 1895, it was purchased at a large price, and is now about to be operated, by an organization, under a State charter, granted to the The Plattsburgh Gold Mining and Milling Company. The main office of this company is Plattsburgh, N. Y. Mr. Albert W. Emery of Plattsburgh is president, and Mr. W. H. Stephenson of Troy, N. Y., one of the directors, is local manager of the mine.

The special feature of this property, and that, for the development of which this company was organized, is an ore-body from six to eight feet in thickness, made up of many quartz stringers intercalated in mica-schist. These stringers, as is usual with such ore-bodies in Georgia, vary in thickness, from a thin wafer to six inches. It is identical in character with the vein on the Thompson property,² except, that, judged from present exposures, it carries less quartz than the Thompson vein. It is known to extend in a northeastern course, dipping sharply to the southeast through a ridge running parallel with the Chattahoochee river. The ridge itself is the present terminal of a long southern spur of Tray mountain, and has an altitude of about 300 feet above the river. Toward the river, and also to the north, although much shorter, its slope is almost precipitous. In the past, on both sharp slopes of the ridge, the ore-body has been stripped for some distance, and tunnels have been extended in, a hundred feet or more. At the

¹ The present owners began work, and cleaned up the working tunnel, some time after I had collected the ores from this territory, hence no Survey assay of their ore appears.

² See page 37 and Plate IV.

time of purchase by the Plattsburgh people, they removed from the accessible tunnel on the river side a large amount of ore, and shipped it to Messrs. Ricketts & Banks of New York City for assay, and for mill and concentration test. The report from these well-known mining experts was as follows : —

Assay of the original ore . . .	{	Gold . . .	0.14 oz. Tr. per ton
	}	Silver . . .	Trace only

MILL AND CONCENTRATION TEST. — An average sample of the ore was passed through a stamp-mill over amalgamated plates, and then over a Frue-vanner with the following results : —

Ore taken, 750 lbs.	Assay, Gold, 0.14 oz. per ton
Concentrates saved, 10 lbs.	" " 0.20 " " "
Pulp from plate tailings, 28 lbs.	" " 0.03 " " "
Left in battery, 36 lbs.	" " 0.05 " " "
Actual tailings, 676 lbs.	" " 0.02 " " "

These results show an extract of gold, on the plate, of 82.7 per cent. of the assay value of the ore, and that only 1.9 per cent. of the assay value of the ore can be saved on the Frue-vanner, a proportion too small to be of any practical value. This is probably due to the fact, that the portion of sulphurets in the sample is small, and that the iron is in an oxidized condition. This is shown by the character of the concentrates, which consist mostly of black sand. The amount of gold recovered on the plate could probably be increased 4 per cent. by using a large plate surface, so that it will be safe to count upon fully 86 per cent. of the assay value of the ore, as saved by amalgamation.

“ The results stated prove : —

1. That this ore is low grade, not exceeding probably \$3 per ton.
2. That the gold is free, and that the greater portion of it can be saved or caught on amalgamated plates.

3. That the amount of sulphurets, or concentrated minerals, present in the ore, is not sufficient to warrant concentrating the tailings from the stamp-mill; but that, as it is possible, that the oxidized mineral may eventually change to sulphurets in depth, any mill erected should be arranged so that a Frue-vanner can subsequently be added thereto."

Basing their calculations for the value of the ore on this conservative report and on an estimation of the amount of ore thoroughly desulphurized, as shown by present developments, they have begun the construction of a steam ten-stamp mill on the north bank of the Chattahoochee, close to the vein; also a trestle, on the hill-side leading down to the mill, a chute upon which will send the ore into the battery-room. These works will be completed, and regular mining operations commenced, about April 1st, 1896.

If the ore meets the mill-test of Ricketts & Banks — which seems most probable, because the ore shipped was a very fair sample — this company will have made a profitable investment. They are close to a base of supply, being about fourteen miles from Clarkesville R. R. station, with an admirable intervening wagon-road. Fuel and good labor are cheap; the mill is first-class and well situated; and, furthermore, the ore-body offers most advantageous natural facilities for easy and inexpensive removal. Finally, it is most probable, on account of the increasing interest attached to the discovery of cheap methods for the extraction of gold from sulphide ores, that, even after the oxidized ore has been milled, this extensive ore-body may be worked successfully.

**THE NACOOCHEE HILLS GOLD MINING COMPANY'S
PROPERTY**

The property of this company consists of the following lots or parts of lots lying in the gold belt : —

<i>District</i>	<i>Lot</i>	<i>Acres</i>
3	5	600
3	6	
3	27	
3	28	
3	38	225
3	39	
3	40	
3	9	250
3	25	250
3	26	250

Part of 250

In addition to the above acreage, the company owns some hundred acres outside of the gold belt, sufficient to make a total of 2,300 acres.

Since the lots of this property, lying south of the Chattahoochee river, are owned conjointly with the Martin and St. George, in order to avoid repetition, they will not be described here, but under the head of the other properties.

Special attention, therefore, will be directed to those lots, not hereafter described under other heads, upon which mining and prospecting has been done. In order to facilitate the understanding of the description, a plat of these lots with notes is presented.

The main branches, shown on the map,¹ also smaller water-courses not platted, have been washed for gold in the past, with results common to branches in this region. The work, nevertheless, has not been carried on so extensively, as on the streams south of the river; and hence considerable gravel area has been left untouched. This is especially true of Smith's creek, which flows through the old Trammel place; the cultivation of the fine bottom land of its course has been little disturbed by mining.

The *Bell Branch* has been much worked over, in lot 40 and the southern part of lot 25; but the north half of the lot presents a considerable tract of virgin gravel deposits, along both the water-course and the dry hollows leading into it.

Pan-testing on lot 27 has been conducted along the northern slope of the ridge, by which Smith's creek flows; and an auriferous saprolite body has been found to extend through the center of the lot. Neither its width nor auriferous extent has, as yet, been determined. Across the southeast corner of the same lot, surface cuts have revealed another gold-bearing saprolite lead, a full one hundred and fifty feet in width. These cuts show the presence, in the saprolite, of a large number of small quartz stringers. A tunnel is now being driven in, on the southeast slope of the ridge, in order to better determine, if possible, the value of this belt. This saprolite lead has been traced on to Curly mountain; and its location would suggest, that it is a continuation of the belt exposed at the Dean cut on the St. George property.

Still further to the east, on lot 26, is the auriferous belt, cut at the Conley place. No development has been made upon this.

On lot 25, a cut has located a solid quartz vein. As yet, no efforts have been made, to determine its extent. It strikes N. 60° E., dips 65° S. E., and is apparently conformable to the enclosing schist.

¹ See page 44.

The vein, as exposed by a ten-foot shaft, is about sixteen inches thick, and strongly impregnated with oxidized iron sulphide. Pannings of the wall material offered such good results, that a sample of the ore was taken for assay. The report on the assay of this ore, made by the Chemist of the Survey, was as follows:—

Cut No. 1 0.40 oz. gold (\$8.00) per ton

With this assay result in view, it is perhaps unnecessary to suggest, that the extent of the ore-body be better determined, and other tests of its value made.

Mr. Charles Roberts of London, England, resident at Robertstown, Nacoochee Valley, President of the company, has been now steadily engaged in improving the property, for the past year. His work, in the main, has been toward the improvement of the farms, a large tract of their land being a part of Nacoochee valley, or rather bottom lands of the Chattahoochee river. On the old Trammel place, a small colony, with substantial frame buildings, has been founded; likewise buildings have been constructed on other farms, and the houses of his tenants have been suitably repaired. In the midst of these general improvements of the farming interests, time has been taken for prospecting. It is the intention of the company, to gradually develop the mineral interests of their property, for the present, and, later, to engage regularly in mining the gold deposits.

THE MARTIN MINING PROPERTY

Mr. John Martin, of London, England, whose present residence is Cleveland, White county, Ga., controls, in this county, the largest collective gold tract in North Georgia.

Following is a list of the Martin mining properties, situated in the 3rd and 4th districts of White county : —

District	Lot	Acres	Remarks
4	9	250	Not in the Gold Belt.
4	10	250	
4	11	250	
3	12	250	
3	2	250	
3	29	200	
3	30		
3	32	250	
3	33	250	
3	34	250	
3	35	250	Conley Mine and Farm. Nichols Mine. Frazier Mine. Hamby Mine. Curtis Mill Tract. Not in the Gold Belt. Not in the Gold Belt. White-McGhee Mine; 20-stamp Mill. Richardson Mine. Russell Mine. Powell Mine. Park's Mine. Oliver Mine.
3	36	250	
3	37	125	
3	39	125	
3	57	128	
3	58	250	
3	59	15	
3	60	47	
3	62		
3	63	190	
3	64	125	
3	70	250	
3	71	250	
3	90	63	
3	91	94	
3	93	250	
3	99	125	
3	100	250	
3	101	250	
3	126	250	

A large part of the acreage enumerated above does not lie in the gold belt; its position, with reference to water-rights, timber etc.,

is such, however, that it makes an essential complement to the gold-bearing area.

The nucleus of this property was brought under one management, in 1857, by "The Nacoochee Hydraulic Company" of Boston, with J. R. Dean, Jr., of Nacoochee, as mining superintendent. They possessed, in fee simple, only 875 acres; but they controlled, by leases, most of the auriferous lots, embraced between Duke's creek and the Chattahoochee river, which they worked, at a royalty of one-tenth of the gold produced. Active measures to develop the property commenced in 1860; and, at the breaking out of the war, the present canal was completed, water running through, and ready to be used for the hydraulic operation of the gold fields, which it commanded. The cost of building this canal was about \$50,000. The war suddenly arrested all work; but, upon the restoration of peace, work was re-commenced; and this company, followed later by others, prosecuted successfully hydraulic mining, for some years. During this period, some of the largest nuggets ever found in Georgia were taken from these hills, besides many thousands dwts. of gold in grains.

Mr. Martin came into possession of the property, about five years ago, and has been zealously at work, adding new and important territory by direct purchase, until he has now brought it to its present magnitude. In the past year,¹ the ditch has been completely repaired, and, in many respects, improved; and a large 20-stamp mill has been kept running, day and night, working ore, taken from the Reynolds vein, and selected surface ore, very abundant in many localities, which he has had collected and hauled to the mill. In addition to his own large working force, numerous small parties are given brief leases, to work at the various deposits; such parties pay to him one-tenth toll, and are provided with giants and water

¹ 1895.

privileges, at the rate of 50 cents a pipe-head. In conjunction with his mining operations, he carries on a commissary store, through which much of the mining labor is paid, and to which the lessee-miners carry their gold. By such business-like management, he has been enabled to improve his property, and increase its size. Indeed, the commissary department, toll on leases, and rent of water could be made in themselves to pay a fair interest on money invested. Nevertheless, in addition to these, his own working force has been profitably engaged.

The auriferous formation of this property consists of saprolite, stream deposits, on both hill and bottom land, and veins. In the description of this immense property, these deposits will be discussed collectively, and in the above order.

Topographically considered, this region forms the water-shed between Duke's creek and the Chattahoochee river, and is a long spur of the Blue Ridge with a southeasterly trend. It has one prominent elevation, known as Hamby mountain, which, on lot 36, attains an elevation of over 2,300 feet above sea-level. This stands in the midst of the Nacoochee mining field, and gives rise to many mountain branches, which flow down its sides, and stretch out south and north to Duke's creek and the Chattahoochee river, respectively. The valleys of the branches are deep, and the ground rises rapidly on either side, so that there is a ridge or spur between each. The map¹ shows the course of these streams, and the relative location of the branches flowing into them.

Present evidence points to the saprolite,² as the chief supply of the stream gold to this property, and large areas of it are to be found here. Indeed, one can hardly wash a pan of dirt, along any of the prospecting cuts, without obtaining some gold. Moreover,

¹ See page 44.

² See page 34.

by selecting the dirt for panning—in which case, one familiar with the formation would choose the black seams, occupied by iron oxides—a rich showing of gold will invariably be found in the concentrates. Whether, or not, all the saprolite areas are auriferous, prospecting has, as yet, not revealed; but, where testing has been carried on, such areas have been found to be gold-bearing; as, for instance, *lot 60*, where large excavations have been made in the saprolite, which is not extensive, but, in places, at least 75 feet deep, as shown at excavations near the reservoir. In this locality, certain strips were worked, with most excellent results. On the north side of Hamby mountain may be sighted the large excavation made by the St. George Company, where they are now working, an extension of which area will be found on this property. Excavations, also, are to be seen in the saprolite at other points, where auriferous leads have been followed to some purpose.

The total amount of gold, already taken from the branch deposits, is something enormous. The branches, especially during the wet months, are perfect torrents, with an immense erosive power; during such periods, also, they are supplemented by innumerable mountain rills, at other times dry. Centuries of such powerful and continued action, on the feeding saprolite and decomposing veins of this auriferous body of land, have made the deposits of these branches the most richly productive in Georgia.

Long Hungry Branch, the only branch of Mr Martin's property flowing into the Chattahoochee, has the most extended deposit, of any branch on the north side of the Hamby water-shed, being, as its name implies, of unusual length, and having many feeders. The quantity of gold, removed from its deposit, show extensive areas of saprolite along its course; and inspection reveals much placer ground yet untouched. The banks, moreover, show valuable hill deposits. Four or five feeders, or forks, enter the branch on the

north side, and nearly all these have hill deposits on the left banks, near their mouths. The main deposits offer hardly any drainage for washing; hence artificial drainage will be required, when they are worked. The dry hollows and hill deposits should claim attention. The main deposits of this branch are estimated to have yielded over \$100,000 worth of gold.

Richardson Branch rises in *lot 71*, and enters Duke's creek on the eastern side of *lot 91*. It flows along the eastern edge of the gold belt, and has disclosed good deposits. As it approaches Duke's creek, the land becomes flat, and the drainage of the deposition ground, too slight for natural sluicing; hence little work has been done here, in the past, and considerable virgin ground is offered for the modern methods of hydraulicking.

Black Branch heads in *lot 70*, at which point the surface spreads out, fan-like, with diverging dry hollows, where pits sunk to bed-rock have revealed gold in the saprolite. Between this branch and the White-McGhee branch, is a hill-deposit, from which Mr. Dean took about \$1,500 worth of gold, mainly nuggets, in 1860. The largest of these nuggets weighed 69 dwts., 115 dwts. and 387 dwts., respectively, the last believed to be the largest nugget found, up to that time, in Georgia. All showed marks of much attrition. This branch is noted for its coarse gold.

White-McGehee Branch rises in Hamby mountain, between the sources of the Hamby and Long Hungry branches, *lots 59 and 60*, and flows south through the center of *lot 90*, entering Duke's creek, just above the twenty-stamp mill. It has been the scene of spasmodic, but extensive, mining for years. Midway, in its course, it passes over a hard ledge of siliceous gneiss, which forms a waterfall, about fifty feet high. This has been the means of forming a large flat tract below the fall, underlaid with auriferous gravel. From this basin, much gold has been removed, although the workers

have been hampered by poor drainage. Below this fall, the branch has been richly productive, to Duke's creek. The Reynolds vein crosses the branch, just below the fall, and is presumed, on account of its present richness, to have assisted these lower deposits quite considerably.

For such a fertile gold area, few veins have yet been cut, which it would be profitable to work. Naturally, their presence is assumed; but, thus far, they have escaped attention, although, up to the present time, search for them has been of secondary importance, so vast have been the workable areas of other deposits. It is very probable, however, that, while the saprolite leads are being operated, evidence will be forthcoming to give clues to the source of the nuggets and coarse gold, which the placer deposits are continually giving up.

One vein, nevertheless, of considerable promise was discovered by Mr. Reynolds, early in the gold history of this region, and was worked down, to the depth of fifty feet, along a cut of about seven hundred feet. The ore was carted to a little stamp-mill, erected on the White-McGhee branch; and the milling, according to Mr. Charles Williams of Nacoochee, who received the toll, amounted to, from \$1,500 to \$2,000 a week. According to the same gentleman, the entire yield of the vein, when worked by Mr. Reynolds, was \$66,000. When first inspected by me, the walls of the excavation had fallen in, thus covering a considerable portion of the vein; but, near the center of the cut, the vein was well exposed and open to examination. It was found to consist of compact milk-white quartz, from twelve to eighteen inches in thickness, carrying pyrite partially oxidized. This ore-body is apparently conformable to the hard hornblendic schist, in which it lies; it strikes N. 40° E., with a dip of 70° to the southeast. To the east of this ore-body, are to be seen other veins, similar as to nature, but more lenticular

and less continuous. The band of hornblendic schist, in which it lies, is not over thirty feet in thickness ; but it is so hard and tough, as to be moved only by blasting. On either side of the hordblende, are most thoroughly decomposed mica-schists. An average sample of this vein, taken along a ten-foot exposure, gave in the laboratory of the Survey, the following results :—

First assay 0.562 oz. of gold per ton

Second assay (duplicate) . . 0.520 " " " " "

At \$20 per ounce, the value of this ore would be \$11.24 and \$10.40 per ton, according to the respective assays.

These results are certainly indicative of an ore-body, which can be operated profitably, and are encouraging to the future working of the Reynolds vein. At the present depth of the worked portion, free-milling will, hereafter, be impossible ; therefore a plant for desulphurizing the ore will be required. The past history of the vein and its present indications argue favorably toward the establishment of such a plant.

The Conley Vein, so called, is located north of center of lot 39 ; it was worked, some years ago, by local miners. All the gold, taken from it, was obtained by sluicing, no part of the ore-body being milled. The excavation on the vein shows the presence of very little quartz ; and, therefore, it might preferably be called a rich lead in saprolite. Mrs. Conley, who owned the lot, up to a short time ago, refused a working lease on the vein, soon after its wealth was discovered. The sample taken by me showed, on assaying, only a trace of gold. This sample, however, was taken at random, with no accurate knowledge of the lead, in which the miners had made their discovery.

The few other veins, discovered on these properties, were either not in a condition to be examined, or were too undeveloped, to require special mention.

As already stated, the properties, controlled by Mr. Martin, are splendidly equipped for development; and their topography, as a whole, is most superior for mining operation. On the north side of Hamby mountain, is the St. George ten-stamp mill, on *lot 36*, and on the south side, on *lot 70*, Mr. Martin's twenty-stamp mill. This twenty-stamp mill is finely housed and perfectly equipped, and is run by a turbine-wheel, water being supplied from the Hamby ditch.

The principal feature of the property, in the way of equipment for mining operations, is the Hamby ditch. This aqueduct takes its water from Duke's creek, on *lot 33*, and winds around the slopes of Hamby mountain, with a gentle and uniform grade, five feet to the mile. Its course must necessarily be uneven; but it is rendered more so, by the engineer's endeavor to avoid the building of trestles. On account of its elevation, which, in *lot 36*, is 350 feet above Duke's creek, this was rendered possible. Although the lower end of the ditch is only three miles, in a direct line, from the dam, its complete length is about seven and one-half miles. Its elevation above, and its location in respect to, the known deposits is such, that it is universally acknowledged to be the key to the entire auriferous area between Duke's creek and the Chattahoochee river. The original expense of constructing this ditch has been given.¹ In the summer of 1894, it was thoroughly overhauled; the dam was repaired, the flumes were reconstructed, and new gates were built at the most advantageous distributing points.

¹ See page 48.

THE ST. GEORGE PROPERTY ¹

The St. George Property consists of about 1,841 acres, lying in the Nacoochee district of White county. Only a portion, locally known as "The Dean Gold Mines," is in the gold belt. The Dean, or auriferous area, consists of a part of the following 250 acre lots:—

<i>District</i>	<i>Lot</i>	<i>Acres</i>
3	37	31
3	38	200
3	59	235

The remaining acreage was secured for water-rights, timber and other purposes. In the *3rd district*, the company owns parts of *lots 27 and 28*; in the *5th district*, *lots 19 and 20*, and one-half of *lot 21*. The lots of the latter district are laid down as 450 acre lots. These latter lots were taken in, with the intention of drawing water from the Chattahoochee to the Dean Gold Mine. During the company's early possession of the Dean mine, therefore, they purchased these lots and the right of way covering the remaining distance, and started a ditch from *lot 20*. Before completing this ditch, however, only three and one-quarter miles being constructed, the Hamby mountain ditch had been completed; and since then, when operating the Dean mine, they have used water from the Hamby ditch.

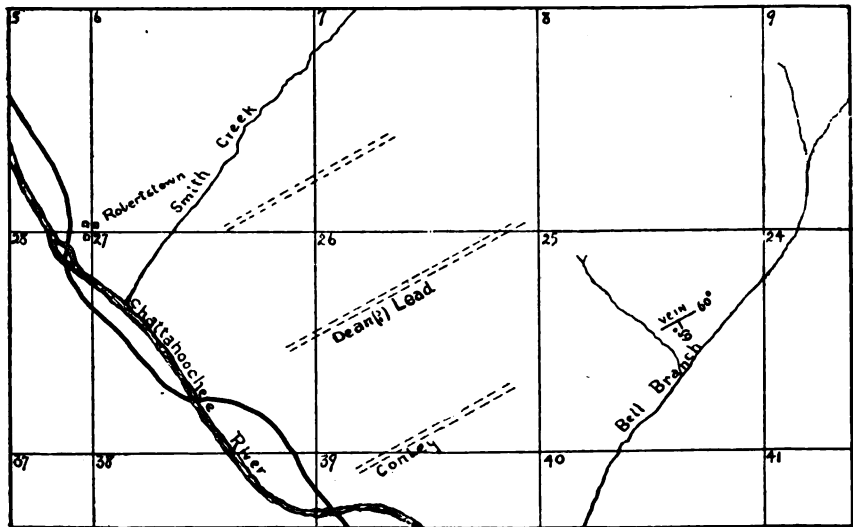
The geological formation, the nature and character of the auriferous deposit, is but a repetition of those of Yonah mountain and the Martin property. The entire tract of gold-bearing land, however, lies on the north side of the water-shed, and its water-courses enter the Chattahoochee river. The deposits of these streams, like those on the south side, have been worked pretty thoroughly, especially near the river.

¹ See map, for the relative position of the lots and their prominent features, page 44.

The Horton Branch has its source outside of the gold belt, and its gravel deposits are perfectly barren, until it approaches the river. Here it flows over flat ground, affording little facility for easy mining. Still, much gold has been taken from points of the deposit, offering the necessary advantages. Basing opinion on what is reported to have been done here in the past, the ground yet unbroken by miners suggests good possibilities for future workers.

The England, the Old House and the Gaten Branches have all been

Fig. 3.



Map of the St. George Gold Property.

worked, again and again, and have proved rich sources of revenue. Each flows in sharp ravines, up to the river valley; and the characteristics of the deposits and ground-course are exactly alike. They are especially of noteworthy importance, on account of their coarse gold deposits and the presence of hill deposits of coarse gravel, which give substantial evidence of old river benches. An inspection of the old work, along these streams, shows, that the miners found frequent inducements to extend their washing up into these



THE DEAN CUT, LOOKING NORTH, ST. GEORGE GOLD MINE, WHITE COUNTY, GEORGIA.



hill deposits. It is quite possible, that these old works would pay, if carefully cleaned; and that, which remains untouched, taken together with the hill deposits, is suggestive of bright prospects.

The most important feature of this property, however, has been exposed by the Dean cut on *lot 38*. Here, Mr. Dean, who was later made mining superintendent of the old Nacoochee Hydraulic Company, operated, for several hundred feet, a quartz vein, or rather stringers of quartz, widening from a mere band to eighteen inches, and continuing in a well defined course; and, from the milling of the ore and ground-sluicing of its walls, he is reported to have reaped a rich harvest. This work was prosecuted, some time after the close of the war. Mr. R. W. Rickard, M.E., who, in 1886, reported on the property, for the St. George people, was especially taken with the rich saprolite, exposed by Dean's cut. Since, in his report, he expresses, in a general way, the consensus of opinion of those, who have made a study of the southern gold fields, and this property in particular, I will quote his words: —

“The precious metal occurs in the following manner: —

Several large bands, or adopting the local term, courses, of gold-bearing schist, run parallel through the gold belt, southwest and northeast. They all contain small quartz veins throughout; and the schist, which generally is comparatively hard, in these courses is quite soft, and can be worked almost with a shovel. It is difficult to determine the cause of this softness; one thing is remarkable, that quartz veins, from the thickness of letter paper up to eighteen inches, exist throughout this soft and productive ground, having the same run and dip, as the courses themselves; and to these veins, probably, is attributable the deposition of the precious metal, as well as the softening of the mica-schist. The gold is free from sulphurets, and consequently may be treated effectually by amalgamation. In connection with these veins of quartz, there is a con-

centration of gold-bearing material; in fact, the quartz itself is auriferous, showing, upon assay, from $\frac{3}{4}$ ounces upwards, per ton."

At the time of my visit to this excavation, no work had been done, for some years; and the vein was not sufficiently exposed, to take a fair sample for assay. In the spring of 1895, a ten-stamp mill, run by a turbine-wheel, supplied with Hamby ditch water, was erected; and, since then, the St. George management has been constantly milling the quartz and harder portions of the saprolite. First of all, however, they cleaned up the old box ground-sluice, which had been acting as a drain, during these lapse of years, and found about 300 dwts. of gold. The size of the return was unexpected, and hence extremely gratifying. The cut is now being extended along the lead of the vein, by the simple erosion of water flowing down from the Hamby ditch. The drain to the river consists of a line of two-foot sluice-boxes. Just before the drain reaches the mill, there is another system of boxes, connected with the main drain in a Y, so that large quartz masses and hard pieces of schist may be sent down in the sluice-boxes toward the mill. About fifty feet from the mill, all the large material is caught in a big bin, broken up, and forwarded, by the emptying sluices, to the mill. The illustration¹ shows the St. George cut, from a point about midway, looking toward the mill and river. A close inspection will show the system of transferring auriferous material to the mill.

At present, about six men are at work in the cut, with pick and shovel, guiding and assisting the action of the water; another man is stationed at the mill feeding the batteries.

Mr. John Martin has an interest in this property, and manages it in conjunction with his own.

¹See Plate II.

THE YONAH LAND AND MINING COMPANY'S PROPERTY

The Yonah Land and Mining Company controls one of the largest contiguous acreages in North Georgia. This body of land lies in the 3rd district along the watershed of Duke's creek, and comprises lots 60, 61, 62, 67, 68, 69, 89, 90, 91, 92, 103, 104, and one half of 105, forming a tract of about 3,268 acres. It may be well to add, that a few small areas in some of these lots are owned jointly with other companies. Besides the above tract, they own the mineral interest in lot 14, 6th district.

"The property is a consolidation of what was formerly known as "The Tonton Mines," "The Mercer Mines" and "The Butt Mines." These mines were all adjacent; and, because of the water supply, gold belts, and many other advantages, arising from the ownership of such a large territory, they were consolidated into one property, purchased for a large sum, and given the name of "The Calhoun Land and Mining Company." The property has been known in this way, for a series of years; but, recently, the present company has applied for a new charter; and the property will henceforth be known, as the Yonah Land and Mining Company's property, or, in brief, the Yonah Gold Mines."¹ The lots of land included in this property, with the exception of lot 14, 6th district, and their relative positions to each other, are shown on the map.²

There are thirty cottages on the property, twelve of which are frame buildings; and all are suitable for the occupancy of miners. Besides these cottages, there is a commissary building, now un-

¹ See pp. 3 and 4, Report of E. T. Whatley, on "The Yonah Land and Mining Co. of White Co., Ga., 1893."

² See page 44.

tenanted, and an equipped blacksmith shop. All these are accessible, by wagon roads.

"The cleared, cultivated lands consist of approximately 218 acres. Of this, about fifty acres is fine bottom land, and would, if properly cultivated, produce 1,500 bushels of corn. The remaining 168 acres ought to produce 1,000 bushels, making a total yield of 2,500 bushels. These lands would produce other crops in the same proportion. The farms, however, have been poorly cultivated, and the yields have never been what they should. Besides these cleared farms, there are approximately 300 acres of excellent farming lands, that have never been cleared of their original forests. Similar land, in the same vicinity (Nacoochee valley) has sold for \$40 per acre, for farming purposes. The farms are well watered, easily drained, and seldom, if ever, damaged by overflow. They contain many convenient springs of pure freestone water, for drinking purposes. The soils are light-gray and mulatto color, and easily tilled."¹

These lots, likewise, are generally well timbered; and Mr. Whatley has estimated, that they contain many thousand feet of marketable timber, consisting of pine, oak, hickory, poplar, chestnut and maple.

The property is especially well watered. In addition to Duke's creek, a large stream, with a fall of 220 feet, which traverses the property, there are also Mill creek, Mercer branch, Pardue branch, Kelly branch and Stoner branch, all of which can be utilized, in operating the mineral areas of this property.

When operated by the Calhoun Company, a ditch seven miles long, extending entirely through the property, was constructed, at an expense exceeding \$7,000. "This canal has a fall of 63 feet,

¹ See p. 5, Report of E. T. Whatley on "The Yonah Land and Mining Co. of White Co., Ga., 1893."

from its source to the mouth, and an elevation of 93 feet above Duke's creek, at its mouth, *lots 72 and 89*. It carries a volume of water sufficiently large to run a 10-stamp mill, with a 40-foot fall, at any point along the canal. The size of the canal can easily be increased, at any time, at small expense. Since its construction, at various times expenditures have been made on its improvement and repair; and the canal is now in good condition, and the water, ready for use, either to work the placer mine, or to operate a mill located at some point along the canal."¹ Besides this ditch, the property lies in such a position, with reference to the Hamby mountain property, that the Hamby ditch alone could be made to play an important part, in operating the Yonah Mountain mines.

This property is not only essentially rich in placer areas; but it contains, already opened up, several veins, assays of which are indicative of considerable economic importance.

Mr. Whatley states, that, as near as can be estimated by information gathered from all sources, between \$500,000 and \$1,000,000 have been taken from the Yonah Gold Mines. Work on the streams and bottoms has been going on, almost continually since 1830; and there still remain virgin areas. During the summer of 1893, Mr. Whatley reports, that he himself removed from one of the placers \$2,000, at an expense, not exceeding \$1,000. The work, however, during the earlier periods, was conducted in such a crude way, that so much of the fine gold was left, that, at each re-working — a most common occurrence even to the third time — the labor has been profitable.

The gold deposits of all the branches, platted on the map,² have been more or less worked in the past; but, in some instances, and

¹ See p. 8, Report of E. T. Whatley on "The Yonah Land and Mining Co. of White Co., Ga. 1893."

² See page 44.

especially at certain points, they will pay another overhauling. Returns, however, from the deposits of the branches, flowing into Duke's creek from Hamby mountain, have far surpassed those entering the same from the south.

For instance, Hamby branch, with numerous heads in *lot 60*, has been one of the most important gold-fields of this county. It has been found to be rich in gold, to the very head. Moreover, the upper and steeper portions of the valleys of its main stem and forks have not been worked much; these present good ground for washing. There are, also, many dry hollows, extending off in different directions; and it is presumed, that nearly all of them contain valuable deposits of gold; for, wherever water could be had to wash with, there have yielded splendid returns. On the main branch, the washing in of the gold has been on the left side, at many points. Indeed, not only on this, but on other streams having the same direction, it appears to be generally true, that the gold deposit is richest along the western bank. The early workers found it too laborious to operate these deposits cleanly, on account of the deep overburden; hence considerable has been left, which hydraulic mining will render easy and profitable.

As Hamby branch approaches Duke's creek, the ground of the deposit becomes low and flat, spreading out over considerable surface. This was found to be very rich; it afforded large amounts of gold; but it could not be worked out, with success, on account of poor drainage. With the present equipment for such mining, therefore, there is still to be found fertile areas for successful work.

Furthermore, there are many points along the course of the branch, where there are indications of good hill-deposits. These lie on the banks, or slopes of the hills, along the main forks of the branch, and also on the points of the hills between the forks. The main hill-deposit, however, is on the ridge, or hill, above the

branch, where there is a fine show of stream-gravel, much rounded and probably rich in gold. Some of these deposits have been washed; but much remains for the future.

Another branch, which has been much prospected, is Mercer branch. This is at the upper edge of the gold belt, and extends from Hamby mountain, southeast, to Duke's creek. Like all the other gold-bearing branches, this was washed, soon after the discovery of gold in the Nacoochee district, and was found to be auriferous throughout, as is shown by the gravel-banks and pits along its course. It has several subdivisions of forks, which also contained good deposits, and have been worked out, almost to their source. One of the forks extends, in a northwesterly direction, beyond the upper edge of the gold belt, and is consequently barren of gold. Near its entrance to Duke's creek, on the western bank, there is an accumulation of water-worn boulders, or river drift, in the soil, which shows a river deposit, doubtless auriferous. There are hill deposits, also, on several of the points between the main branch and its forks.

Pardue Branch, Bramlett Branch, Alabama Branch and Kelly Branch have also been worked successfully; and numerous points along their course may still be subjected to hydraulic mining, with satisfactory results. In fact, the inspection of these stream deposits, although the returns have not been so rich as the north branches, reveal similar characteristics and equally as encouraging prospects, as those branches already described.

The main placer area of this property, and the one, which will be especially referred to, in this report, lies along Duke's creek, in lots 89 and 90, and comprises, in all, a complete body of, perhaps, fifty acres. Since my attention was directed to the gold-fields of the State, Mr. Whatley, local manager of the Yonah Gold Mines, has been concentrating all his mining operations on the placer of

these lots. In passing, it may be said, that, previous to his management, \$1,500 in nuggets was removed from one pit, in two days.

Mr. Whatley's first work consisted in clearing out a pit, just uncovered by his predecessor; the returns were most profitable. He next turned his attention to the head of this large body, near the entrance of Duke's creek. Here he spent some months of 1894, working one giant and two hydraulic elevators. The numerous freshets of this season frequently burst his dam, and filled in the working-pit. This occurrence, not once, but many times, caused the expenditure on necessary, but unprofitable, labor to exceed the returns. Yet, gold was taken out, in sufficient amounts, to more than warrant the expense, barring untoward accidents. Later, he removed his plant to a point, about midway between the old location and the Cleveland road, on *lot 89*. Here, he worked out two pits, whose total surface area would consist of about 250 square feet; and he reports, as his return, 3,000 pennyweights of gold.

During the past winter he has made a radical change in his plant. He has introduced a steam-pump, with fire-hose and nozzle attachments, and has devoted the entire power of his ditch to draining the working-pit. This complement to his new plant consists of a thirty-six horse-power engine and a Worthington duplex-pump, with four rubber fire hose-pipes attached to a main force-pipe. All are new.

For celerity and ease in work, this is very plainly a decided improvement over the old system. The pump furnishes, under a seventy-foot pressure, 1,000 gallons of water per minute. This is sufficient to supply the four hose attached. With these easily shifted hose, the objective point of the hydraulicking can be changed, at a moment's notice; whereas, with the old plant, much time was lost, in replacing and jointing the heavy iron pipes, and adjusting the giant. Besides, he can distribute the water force of these hose

at various points in the pit, unite their attack collectively, or by stops, turn such force, as may be desired, on different hose.

The cost of running this plant, not including pipe-men and pit-workers, is estimated at about \$3 per day, which estimate, according to the manager, is practically the expense of running the old plant. In addition to the advantages already enumerated, with fewer men, they can accomplish with this plant an equal amount of, if not more, work, in a day. Mr. Whatley finds, after a month's trial, that each hose will clear about two ten-foot pits per day.

The different pits, worked in this bottom, and the present working-pit, show, on an average, a nine-foot "topping" and three feet of gravel. The main body of this overburden, being light alluvium, is easily removed; but, on the gravel, there rests from six to twelve inches of peat and blue clay, which offers considerable resistance to hydraulic action. To a large extent, the gold is coarse, and many small nuggets, well-rounded and water-worn, abound. Not infrequently, moreover, the gold is found aggregated in pockets. Furthermore, the gold is especially fine in quality, carrying only a slight percentage of alloy. A photograph showing the plant and working-pit was taken March 9th, 1896.¹

In addition to the placers, prospecting has disclosed a large number of auriferous veins, which preserve, in some instances, considerable continuity along the strike. These are generally exposed by cross-cuts; some, however, have been stripped, for a short distance, but only by shallow cuts. All are intercalated with the mica-schist, and apparently conform, in strike and dip, to the same.

The major portion of the veins, now exposed, are on lots 68 and 92. The veins on the latter lot are exposed only by three-foot cross-cuts, so that only a small part of the ore-body is exposed. These vary in width, from two to seven feet, and are much decom-

¹ See Plate V.

posed and weathered. Assays, made by the company, show them to run from \$4 to \$12 per ton. Assays made in the Survey laboratory resulted, in value per ton, as follows:—

Vein 5 ¹ , Cut 12	\$0.00
Vein 6, Cut 13	0.00
Vein 7, Cut 14 . . . . .	.50 — trace
Vein 8, Cut 15	0.00
Vein 9, Cut 16	{ 0.00 2.50

These assays of samples, taken as they were from such small portions of the veins, and, usually, badly broken down, should not be accepted as condemnatory, but rather as suggestive, until further explored. In the case of vein No. 9, while one assay shows no gold, its duplicate yields as much as \$2.50 a ton.

On lot 68, the veins are better exposed than elsewhere on the property; and ore, taken from vein 2, has been worked in small mortars, by local miners, with profit. This vein is now covered, except for about twenty feet. It strikes N. 20° E., and dips 65° S. E. Where exposed, it is not over twelve inches thick, and is rich in completely oxidized sulphides. Average sample material, taken along the twenty-foot exposure, was assayed in duplicate in the laboratory of the Survey, with the following results:—

Assays of sample from vein 2, cut 2	{ \$ 9.40 per ton 13.00 " "
---	--------------------------------

Vein 1, which has been more prospected than any of the others, having cross-cuts, at irregular intervals, for over three hundred yards, varies in thickness, from one to three feet, and corresponds closely to vein 2, in strike and dip. The various exposures do not show it to be as rich in sulphides; but assay material taken from

¹ These veins are designated here, as marked in the field by sign-boards.

the large exposure, next to the most northern cut, gives favorable returns, as shown by assay in duplicate in the laboratory of the Survey:—

Assays of sample from vein 1 . . .	{ \$1.00 per ton
	7.00 " "

It may be seen, therefore, that there are veins at the Yonah Mountain mines, which, probably, can be made to pay at least fairly well, and now offer inducements to development. There is, at present, a large amount of free-milling ore *in situ*; but the Thies chlorination process, or some other method of chemical reduction, must be introduced, to insure continuous success.

Included in this report is a map, showing the location of the ditch on the property, its water-courses, present placer-plant and vein-cut.¹

Mr. Henry E. Young of Charleston, S. C., is President of the company, and Mr. E. T. Whatley, Superintendent and Mining Engineer.

THE THOMPSON PROPERTY

The Thompson Property has lately been purchased by Captain T. W. Hix of Rockland, Me., now resident at Nacoochee, and local manager of the Sall Mountain Asbestos Company. It consists of lot 102, 3rd district, and lies about one and one-half miles southeast of Nacoochee.

This property contains one of the most interesting veins of its class, in this region, cutting the lot diagonally from corner to cor-

¹ See page 44.

ner, southwest and northeast. The vein, referred to, occupies the center of a low ridge, and has been prospected, by open cuts and shafts, the entire length of the lot; and, northeast, into the adjoining lot. It consists of a zone, from six to ten feet in thickness, of quartz stringers intercalated in mica-schist, the country-rock. I have seen no instance, in the counties examined by me, of a similar vein of equal thickness, carrying so many quartz lenses and stringers. In an open cut, about the center of the lot, I was able to make a photograph of the ore-body.¹ This shows the vein in the northeast end of the cut; the larger quartz stringers stand out prominently; and their width may be readily estimated, by comparison with the animate object. The course of the vein is N. 35° E., and dips very sharply to the southeast. The average ore is low grade, probably varying from 50 cents (the assay made by the Survey of its sample) to \$5 per ton; and, as far as prospected, it is free-milling. The picked ore runs high. The situation, however, of the ore-body is such, that there is a large amount of ore above water-level, which is consequently oxidized and free-milling. Prospecting has already developed it sufficiently, to base close estimates on the cost and profit of working the free-milling portion.

During the past few years, one of the native geniuses, by the name of Turner, with his aged mother, has spent a few months in each year, mining and milling this ore-body. The son packed selected ore, in a bag on his back, to a rude mill, a quarter of a mile from the shafts, and emptied it into a nail keg; the mother fed the mill with a shingle. Working thus, from sunrise to sunset, they eked out a good living, for persons of their class, never making less than \$1 a day apiece.

The Turner Stamp-mill² has been accepted by all, who have

¹ See Plate IV.

² See Plate III.

seen it, as the first of its kind. A ten-foot overshot water-wheel, with axis elongated at one side, set in propped posts, constitutes the motor. Three spindles, roughly hewn, are shod with radially arranged and overlapping bands of iron (pieces of a wheel-tire), bound by a ring. These are the stamps. The mortar consists of the remnant of the shoe material. Flat iron plugs, bent at the end, are so arranged in the axis, that, when it revolves, these plugs catch, lift and drop each notched spindle at different intervals. The screen of the mortar chamber is a piece of iron stove-pipe, rolled out, and punctured with nail-holes. A combination sluice-box does the rest.

Neighbors from different parts of the gold belt have infringed upon this model, with perfect impunity; and, as a result, the inexpensive, convenient and profitable wooden stamp-mill has been evolved. The usual cost of construction for a first class one is less than \$100. Several of these may be seen in daily use, in this and neighboring counties.

THE MERRITT PROPERTY

On *lot 124, 3rd district*, Mr. Merritt and others, dwelling in the vicinity, worked, during a large part of the year 1894. Surface panning had revealed an auriferous lead through this lot, and test-pits resulted in the finding of a zone of small quartz stringers, about ten feet wide. The mica-schist, in which they are intercalated, is so thoroughly decomposed, to the depth mined, as to have lost its identity. The stringers themselves, with their "binding," were found to differ widely in value, some being completely barren of

gold; hence they guided their work by panning-tests, and followed only the richest stringers.

They mined in open cuts, and only to water-level, which, here, was never below twelve feet. The ore was carted to a wooden ten-stamp mill, run by an overshot wheel, supplied with water from Castleberry's mill-race. The ore milled consisted of auriferous dirt and sand; the larger masses of quartz, although milled only infrequently, showed free gold. The presence of gold in the dirt and sand, therefore, was due probably to the utter decomposition of the smaller quartz lenses.

During the entire period of operation, these men averaged from 75 cents to a dollar a day, apiece, by keeping the mill running all night. The ore, therefore, is low grade; and its proximity to water-level will make it unprofitable to work, by the present method, because of the presence of sulphides below that point. However, this property, with the adjoining lots, in which the same head has been traced and similarly worked, should be kept in mind for the future.

BAKER & SON'S PLACER PROPERTY

John Baker and Fred W. Baker of Detroit, Mich., control, at the time of this writing,¹ about 2,700 acres of mineral land, lying a few miles north of Cleveland. For the past twenty months, their work has been confined to the placer area of *lot 162, 3rd district*. This lot contains about twenty-five acres of bottom land, portions of which have been worked at infrequent periods, for many years. Up to the time, that Baker came into possession, it was known as

¹ February, 1896.

the "Longstreet" lot; and, at this time, a portion of five acres had been more or less gouged. Since the Bakers began operations, these five acres have been carefully washed, using one- and two-inch hydraulic giants, supplied with water from a small ditch, giving a thirty-five foot pressure; also, other small areas. Finding that the re-working of the old works about paid the attendant expense, and the other testing being unusually satisfactory, they have now proceeded to a thorough equipment for placer-mining. Their late expenditures have been toward gaining further acreage; building a large dam and a seven-mile ditch, at a total expense of three thousand dollars; and for piping, giants and hydraulic elevators. When this equipment is complete, they will undoubtedly have one of the best plants for placer-mining, in North Georgia. With the new ditch, they will have a water-pressure of one hundred and twenty-five feet, and sufficient water to run at least five pipe lines.

Besides the Longstreet lot, they have *lots 158 and 159*. The former is considered the best lot in their property; but water is absent. The latter contains the Teasley branch, which is locally famous for its gold-bearing gravel.

The work, as conducted here by the Bakers, is in striking contrast with the usual placer-mining in this country. Bringing into their work both business thrift, and considerable mining experience, they are not neglectful of the future. Instead of destroying the rich and fertile bottom lands in their search for gold, they operate the land in such a manner, that only a brief time must elapse, before the bottom will be rejuvenated, and in an arable condition.

THE BLAKE PROPERTY

The developed portion of the Blake Property includes *lots 26 and 47, 4th district*. A large amount of prospecting and mining must have been done here in the past, judging from the present appearance of the surface. The Sprague vein was especially worked. From local reports concerning this vein, it is concluded, that the ore was quite prolific in free gold. In two shafts on *lot 26*, this vein shows a thickness of four feet, and contains a large amount of pyrite. It was impossible to obtain a fair test-sample of the vein; but surface specimens were suggestive of a medium-grade ore. Special attention should be directed to this vein. It is evident, from the appearance of the property, that the hopes of the operators, based on the wealth of the stream gravels and surface ore, were frustrated by the occurrence of the unoxidized sulphides.

THE ATKINSON PROPERTY

The Atkinson Property lies about five miles west of Cleveland, the county seat, and consists of *lot 48, 4th district* of White county. Lying, as it does, in the midst of a fertile gold-field, it has been more or less prospected superficially by local miners. Indeed, one of the three branches, running through the property, yielded such attractive returns to the native gougers, that it has been dubbed "The Gold Branch"; and it is thus locally well known.

The schists and gneisses of the property are of the usual character, striking about N. 25° E., and dipping sharply to the southeast. The saprolitic condition of the formations is especially noticeable,



GOLD VEIN ON THE THOMPSON LOT, NACOOCHIE VALLEY, WHITE COUNTY, GEORGIA.



except in the northwest corner of the lot, where a high hill, with frequent exposures of barren ledge, trends through.

Eight or nine years ago, a vein was opened up, on the south side of Gold branch, close to, and about the center of, the line of the lot. Gold branch was dammed a short distance above; and a ditch, three feet wide and one quarter of a mile in length, brought sufficient water to the objective point, to sluice down the hill-side, and thus work the saprolite and vein. A few men, with pick and shovel, used simply the running water to such advantage, that, in the few weeks spent here, an excavation, one hundred and fifty yards long by seventy-five, wide, was made. A system of sluice-boxes, draining into Gold branch, caught the loose gold, while the vein-matter and hard material was carted some distance to a stamp-mill. Mr. James E. McAfee, who has personal knowledge of the results, reports, that several handsome pockets of coarse gold were found, during this brief investigation, and that the work of the prospector paid well. The present owner, Governor W. Y. Atkinson, has prohibited further work on the property, since his heirship to it.

During the investigation of this property by the Survey, this vein was exposed by Mr. McAfee, for about ten feet, with considerable difficulty, owing to the filling in, consequent upon the lapse of time, since the last operations. The exposed portion of the vein was two feet in width, and consisted of compact white quartz, somewhat stained, and containing a very small percentage of decomposed pyrite. Mr. McAfee informed me that this was the largest known swell in the vein, and that, on either side, as far as it had ever been exposed, the vein would average only a few inches in width. This ore-body conforms, in strike and dip, to the enclosing schists. The swell, as appears especially true, in largely open portions of veins of like character, seemed barren. This

exposure, however, being the best that could be obtained, with our means, and the Reaves stamp-mill being close at hand, a ton of the ore was carted over and milled. It did not pay the expense of milling.

This vein had been discovered by panning along Gold branch. On the branch, above a point opposite the excavation, the miners were hardly able to get a "color," hence the excavation at this point.

The placer areas alone on this property are hardly worthy of consideration, the water-courses being too small. Nevertheless, I am lead to believe, that there is sufficient gold in the saprolite, to make this a profitable gold property, if worked in conjunction with surrounding lots. Indeed, the result of the early work at the excavation, coming, as it does, from an undoubtedly trustworthy source, points in this direction. Likewise, the shafts on adjoining properties, which show the formation to be rich in quartz stringers, assist in confirming the opinion. The difficulty and expense in working this property will be in obtaining water for hydraulicking.

THE HENDERSON PROPERTY

In the past year, the old "Rider Place," *lot 35, 1st district*, has been purchased by Mr. Albert H. Henderson of Cleveland, Ga. Local reports of the returns of its gravel-deposits, and its proximity to the Loud mine, cause it to be considered a valuable piece of mineral land. Jennings creek, which flows through it, has already yielded up exceedingly rich material.

Since purchasing, Mr. Henderson has been engaged, at odd intervals, in prospecting the lot for veins. No important discovery

has been made, up to the present, although rich drift quartz is frequently found.

In the northwest corner of this lot, there is a small ten-stamp mill, the property of Mr. Rufus K. Reaves of Athens, Ga. This has been used, for testing the ores extracted from the different veins, in this region.

THE LOUD MINE

The Loud Mine includes lots 39, 40 and 41, 1st district, White county. They lie in a north and south range, lot 39 being at the north; and each is said to contain 250 acres. It may be located, generally, as fourteen miles northeast of Dahlonega, or five miles west of Cleveland, the county-seat of White.

The geological formation is mica-schist and gneiss, with transitions into, or dikes of, hornblende-gneiss. These strike usually about N. 45° E., dipping from 30° to 60° to the southwest, rarely vertical or inclined to the northwest. The country is of an undulatory character, hills seldom rising high above the intervening valleys.

The auriferous material of this property may be classified as placers, saprolite and quartz veins. The placer areas are quite extensive. They are characterized by a maximum twenty-foot "topping," and from one to four feet of gravel. Coarse gold and nuggets¹ prevail in the gravel. The gravel rests on the slate or bed-rock. The material above the gravel, or the "topping," com-

¹A nugget from this deposit, weighing 83 dwts., was exhibited by the Geological Survey of Georgia at the Cotton States and International Exposition, Atlanta, Sept. 18th to Dec. 31st, 1895 inclusive. One weighing 370 dwts. was found in August, 1894, at the same place, with a number of smaller sizes.

posed, as it is, of the material washing from the hills, contains, in some places, quite a little gold, while, at others, it is barren.

The hills are saprolite to some depth. This rotten rock, or saprolite, is the thoroughly decomposed and untransported mica-schists and gneisses. Such decomposition may extend to some depth, and probably does, on this property. Permeating this saprolite, are bands or stringers of quartz, conforming to the trend of the mica-schists and gneisses, which are most frequently auriferous. The hydraulicking of hills rich in such quartz, on account of the easy concentration of the gold by amalgamation in sluices, is found exceedingly profitable, at several of the mines in this county, notably the Hamby Mountain and St. George, in the Nacoochee district.

Several quartz veins have been located, but not tested. These all conform, in strike and dip, to the country-rock. The only vein, which has been worked in the Loud mine, runs diagonally through *lot 39*. This is the vein, from which the magnificent specimens of crystallized and wire gold, exhibited in this country and abroad, were taken. It was accidentally discovered by Mr. Courtney of Cleveland, Ga., while scraping the underlying slate of a placer. At the point of discovery (the northeast corner of *lot 39*), a shaft was sunk immediately; and, for the first ten feet, the richness of the quartz in free gold is said to have been astounding. The vein, a ribbon at the start, and but a little over an inch in width, during its rich descent of ten feet, increased to a maximum width of two feet, and varied, back and forth, in thickness, to the depth of the shaft. At a depth of sixty feet, work was stopped, on account of their inability to cope with the water. From the depth of ten feet to the base of the shaft, gold was almost totally absent. A definite lateral tracing of this vein has never been undertaken. An outcropping of a quartz vein, however, two feet in width, occurs several thousand feet southwest of the shaft, and may be traced back

roughly to the shaft. Whether there are two distinct veins along this lead, or they are one and the same, cannot be conclusively asserted.

A small branch runs through the bottom, in which this vein is located. Good drainage will be necessary, before thorough work, even in the placer, can be carried on. Although, at the shaft, the level is sixty feet above that of the Tessantee river, which flows along the eastern side of these lots, the topography is such that artificial drainage will be required. This may be accomplished, by running a drain to the Tessantee river,¹ or, what would be more advantageous in several respects, by the use of hydraulic elevators. The placer itself is worthy of this outlay, and the vein certainly should not be ignored on account of its sudden barrenness. Gold veins are rarely uniformly rich; but, on the other hand, they hold the gold in pockets, shoots or chimneys. Tapping a vein at only one point, by a small shaft without levels, cannot be considered a fair test. It may be possible, but it should not be considered probable, that a gold vein, which undoubtedly has been so material, in making the surrounding placer (worked only for about an acre) rich in nuggets and coarse gold, has yielded, already, all its wealth.

Only a few years ago, seven pounds of gold was removed from one spot, close by the shaft. It is in the neighborhood of the shaft, also, that many of the large nuggets, which have marked this property, have been found. While some of the gold obtained here, is smooth and water-worn, many of the specimens are very rough.

Very little prospecting for the location of veins has been undertaken. In fact, work on this property has been confined almost entirely to the placers, and these have been worked in the most primitive way. A ditch, twenty-one miles long, supplies the mines with water for hydraulicking and washing.

¹ Such a ditch has already been surveyed.

As well as can be determined, the placers alone offer legitimate fields for fair profits; and equal, if not richer returns, may be expected from the saprolite areas and the veins.

This property, so long and favorably known as the Loud mine, is owned by Mr. Rufus K. Reaves of Athens, Ga.

THE REAVES PROPERTY

In addition to the Loud mine, Mr. Reaves owns *lot 37, 1st district*. On a ridge, about the center of the lot, a zone of quartz stringers, about ten feet in width, has been quite extensively prospected, and ore from the same has been milled, in a small mill on *lot 35*. During the prospecting, occasional rich pockets have been discovered; but, considered as a whole, the ore-body has not been found to be a successful free-milling ore. Possibly, the only successful method of mining this vein would be, by hydraulicking the quartz, and chemically treating the rusty gold and concentrates.

THE ASHBURY PROPERTY

A zone of quartz stringers, about ten feet wide, beginning in the southeast corner of *lot 57, 1st district*, has been prospected, southwest, through *lots 56, 65 and 66*, of White county, to the Chestatee river in Lumpkin. Along this entire length, shafts, varying in depth to 75 feet, have been sunk on the ore-body; and the ore has been milled with varying success. Work on the lead in White

county had been abandoned, prior to my visit. Most of this prospecting and mining has been carried on, under the personal management of Capt. Ashbury, a citizen of White county, who has done much mining work through North Georgia.

CHAPTER III

RABUN COUNTY

BY S. W. McCALLIE, ASSISTANT GEOLOGIST

The gold deposits of RABUN COUNTY may be described, as belonging to two different auriferous belts, one lying in the extreme western, and the other, in the extreme eastern, part of the county. The former belongs to what is known, as the Dahlonega gold belt, while the latter appears to be the northeastern extension of the Hall County belt. Beyond the limits of these belts, which vary, from one to four miles, in width, are other isolated areas, of limited extent, where gold is reported, to have been found, in the gravel, along a number of small streams. The two belts, above named, are not to be considered as continuous, and equally gold-bearing, at all points along their course ; but, on the contrary, they must be considered, as a number of auriferous veins and ore-bodies, occurring, at irregular intervals, at many localities, along the strike of the schists and gneisses. The western, or Dahlonega, belt appears to have but few breaks, in its course throughout the county. Its limits are fairly well defined ; and its course can be traced, with a considerable degree of accuracy, from the southwestern corner of the county to the N. C. State line. The eastern belt seems to be far less continuous ; and it is well defined, only in the extreme northeastern part of the county, where successful placer-mining has been



THE YONAH COMPANY'S PLACER-MINING PLANT, WHITE COUNTY, GA. *Rich.*



carried on at several places, along the small streams. The area, over which these placer-works extend, forms a narrow belt, with a northeast and southwest trend, not over two miles wide, and less than ten miles in length. Between the southern terminus of these placer-works and the Hall County belt, which extends through Habersham County, is a portion of the belt, many miles in length, in which but little or no gold has, so far, been discovered. For this reason, it has been suggested, that the deposits, in the eastern part of the county, form a southern extremity of a North Carolina gold belt, that has been extensively worked, in Horse Cove, just across the State line. As but little is known of the geological structure of the eastern part of the county, it is, at present, practically impossible, to settle, definitely, which of these views is correct. However, on account of the similarity of the country, and the general trend of the different formations, it is thought best, for the present, at least, to consider the deposits, in the eastern part of the county, as belonging to the Hall County belt, and the Horse Cove deposits, as the northern extension of the same.

The topography of that portion of the county, traversed by the gold belts, is usually rugged and mountainous. The eastern belt lies along the base of a series of high ridges, or mountains, which are often barren of vegetation on their slopes; and which frequently end abruptly, in precipitous cliffs, more than a hundred feet in height, and extending, for long distances. This great chain of cliffs, extending like a broken wall, for miles, together with the barren mountain-tops, called "balls," add, to an already unique scenery, a peculiar wildness, probably to be seen, at no other point, within the limits of the State. Many instances are related, by the older inhabitants, telling how their ancestors, in the early settlement of the country, perched on the tops of these high cliffs, killed

the deer and other wild game, as they quietly fed, along the streams below. Rapid streams and extensive forests of oak, chest-nut etc. everywhere abound. Owing to the rapidity and the abundance of the streams, hydraulic-mining can be carried on, in many places, with a comparatively small outlay, in the construction of ditches and flumes.

The western, or Dahlonega, belt, traverses a section of the county, equally as mountainous, and, at the same time, as well, or even better, supplied with water-power, that could easily be used, for mining purposes. The rocks, occurring along the auriferous belts, are chiefly gneisses and schists. Besides these, there also occur, in places, granites and a number of basic eruptive rocks. The former appear, as intrusive masses, in the schists, usually in the form of pegmatitic veins, varying from a few inches to many feet in width, while the latter occurs, as bosses, with their fringe of lateral apophyses, or dikes, traversing the county, for long distances. A good example of the basic eruptive rocks is to be seen, at the Laurel Creek Corundum mines, on the east belt ; and a similar formation also occurs, within the western belt, near the Smith gold mine, on *lot 7*.

The pegmatitic veins are quite common, throughout the county ; and, in places, they are so abundant, as to form a large part of the country-rock. Many of them are unquestionably of eruptive origin, while others seem to have been formed, as segregations. The different formations, throughout the county, generally, have a northeasterly and southwesterly strike, and a southeasterly dip. There is one notable exception to this, however, along the west slope of Tallulah mountains, where the dip is, usually, to the northwest.

The most extensive mining operations, along the western, or

Dahlonega, belt, have been carried on, in the southwest part of the county, *on lots 103, 104 and 105, in the 5th district.* Gold was first discovered, in this locality, along Dick's creek, on what is known as the Smith property, about fifty years ago, by John Morris, the former owner. Shortly after the discovery was made known, mining operations began and continued, almost uninterruptedly, until the breaking out of the late war. In the meantime, the adjoining properties were prospected; and, in many instances, the gravel along the various streams, tributary to Tallulah river, were found to carry rich deposits of gold. Flattering reports, concerning the richness of the mines, soon attracted many miners, who are reported to have taken out several thousand pennyweights annually, for a number of years. After the war, mining operations again began; but they never regained their former activity. Much of the rich placer being exhausted, attention was now directed to vein-prospecting. A number of auriferous quartz veins are reported to have been worked, to a limited extent; but they were all finally abandoned. Placer mining, on the other hand, seemed to have been more successful; and it has continued, uninterruptedly, until the present. An average miner is said to be able to make, even now, from seventy-five cents to a dollar per day, by "pitting and sluicing." It appears to be practically impossible, with the data at hand, to arrive at any definite figures, as to the total output of the different mines, in this locality, from the time of their earliest workings, until the present. A number of the oldest citizens in the county, who have been acquainted with these mines, since early childhood, estimate the total output from \$100,000 to \$250,000; but it is impossible to state, which of these estimates approximates more nearly the truth. Nevertheless, there can be no question, about certain portions of the placers being immensely rich, and paying the early miners handsome profits.

THE HEDDEN PLACER MINE

BY W. S. YEATES, STATE GEOLOGIST

In the extreme northeastern part of Rabun county, up near the North Carolina line, is a group of placers, which attracted considerable attention, during those times of great activity in gold mining in Georgia, between 1840 and 1850. One of the most prominent of these was the Hedden mine, on which work was begun in 1843. It occupies *parts of lots 99 and 100, 3rd district*, by far the greater part of it lying on *lot 100*, along the Hedden branch and a tributary, which, for convenience, the writer has designated, as *Rhododendron branch*, from the dense undergrowth of that beautiful mountain shrub, along its course.

These two branches rise in adjoining lots, on the top of a mountain ridge known, locally, as the "Buzzard Rocks," from the huge, bare, precipitous cliffs of gneiss and mica-slate, which crown the top of this ridge, viewed from its western side. After a tiresome ride up the mountain, on what is known as the Horse Cove road from Walhalla, S. C., to Highlands, N. C., three and a half miles, north, from Pine Mountain post-office, where the famous Laurel Creek Corundum mines are located, the attention of the traveler is arrested, by a sudden view of the rock-crowned ridge, referred to above, with all its wild grandeur. From the point, where the road crosses, the ridge continues east, for nearly half a mile; and then, turning, it continues north about 200 yards, and then northwest, enclosing a ridge-locked valley, below, which constitutes the main part of the *Hedden Placer Mine*. At the point, where the ridge

turns towards the north, the Hedden branch breaks over its western side, having, long ago, cut a precipitous chasm, through the hard gneissic and schistose rocks, which compose the ridge. The highest point of this ridge is just west, of where the falls of the Rhododendron branch begin. Measured by the writer, with an aneroid barometer, this point is 700 feet above the valley below. The accompanying plat of the main part of the placer,¹ made by the writer, indicates *the valley-outline, the Hedden branch and its tributaries, and the area, here worked as placer.* The old dead chestnut, indicated on the diagram, is as far, it is said, as the deposit was ever worked, only the bed of the stream having been worked, this far. The main part of the work, as will be seen from the plat, was below this.

Between 1843 and 1847, this placer was vigorously worked, by Capt. S. M. Beck, Mr. James Kell and others, some of them leasing 100-foot squares, and washing the gravel mined. After this time, others worked the mine occasionally, until about 1889, when the last work was done by Mr. Than. Talley. Mr. Talley, who is now about 80 years of age, and who had been one of the early workers of the mine, subsequently did a great deal of prospecting work, with the view to discovering the vein, or veins, from which the deposits came; but no deposits, in place, have yet been discovered in this mine. In the unworked area, indicated in the northeast part of the diagram, which consists largely of the lower slope of the ridge, which here gently spreads out towards the west, numerous test-pits were observed, which are doubtless the landmarks of Mr. Talley's search for the mother veins. His work, in 1889, was not very extensive, consisting of two small open cuts. The remains of the long-tom, used by him, are still to be seen, where he left off work. Capt. Beck informed the writer, that he took, from an area ten feet square, along the branch, 50 dwts. of gold.

¹ See fig. 5.

At the points indicated on the plat, the writer had two test-pits sunk outside the worked area, both pits yielding fair returns. After removing the over-burden, which was nearly four feet thick, in pit No. 1, and three feet, in pit No. 2, 10 cubic feet of gravel from the former, about half its superficial area, and all, from the latter, were panned at the branch, and concentrated to two small bulks, which were carefully labelled and brought to Atlanta, where they were panned by the writer, in the laboratory of the Survey. The gold, in both cases, consisted of coarse particles, numbering scarcely less than 25 from each pit. The saprolite of the slates, underlying the gravel, was skimmed and included in the material, panned.

An important discovery was made, in panning the gravel of Pit No. 1. A bright, yellow, heavy sand was found, in large quantity, as a residue in the pan, with the gold. This was afterwards identified by the writer, as monazite sand, which, for the last four years, has been so extensively mined, in North Carolina, for making the mantles for the Welsbach gas-burner, and for others, of the same pattern, now coming into the market. It is probable, that the mining of this material would prove, alone, a source of considerable profit, at this mine.

The following sections of the pits were noted: —

PIT No. 1

Soil (brown loam)-----	7"
Reddish, sandy clay-----	16
Gray, micaceous sand-----	18
Gravel (boulders, pebbles and sand)-----	18 ¹
Total-----	59"

¹ 12 to 15 inches on the side farthest from the branch.

PIT No. 2

Soil (rich, dark-brown loam)	22"
Reddish, coarse sand	13
Gravel (sand, small pebbles and bowlders) . . .	18 ¹
Total	<hr/> 53" <hr/>

The pebbles and bowlders, from both these pits, were remarkably angular, indicating, that they had not traveled far, and that they had not been subject to abrasive action, for any considerable time. The gold was very little worn, and could not have been transported far.

At present, the site of former mining operations is thickly covered, with an undergrowth of rhododendron, alder, laurel, huckleberry, bamboo and blackberry briars, sweet shrubs, ferns, grass etc.; while the ridge has a dense growth of poplar, birch, white pine, holly, chestnut, locust, magnolia (*magnolia acuminata* L.), small oaks etc. All along the branches, are large piles of pebbles and bowlders, evidence of great activity, years ago.

Between the immense cliffs at the top of the ridge, is a fringe of evergreens and chestnuts. Three gaps in these mark the positions of the three falls, represented in the lower right-hand corner of the map.² Over one of these, a mere ribbon of water falls; while the Hedden and Rhododendron branches form beautiful falls. These streams vary from five to eight feet in width, and average about ten inches in depth. From the foot of the falls, the water has a gradual fall, till it reaches the road, beyond which little work has been done. The aneroid barometer indicated a fall of 40 feet from the foot of the falls to the road, $\frac{3}{8}$ of a mile, an average of two close measurements, under about the same conditions.

¹ 5 to 9 inches on the side farthest from the branch.

² See fig. 5.

It is said, that some of the gravel has been worked over twice, and some of it, three times; but the method of working has always been by the crude gum rocker and the long-tom. With such a water-power, and an excellent drainage to the Big Creek, half a mile, below, it is highly probable, that this property would pay well, if worked with hydraulic giants, both for the gold, and for the monazite sand, which is undoubtedly in large quantity. Mr. John D. Verner, of Walhalla, S. C., is said to be the owner of this property.

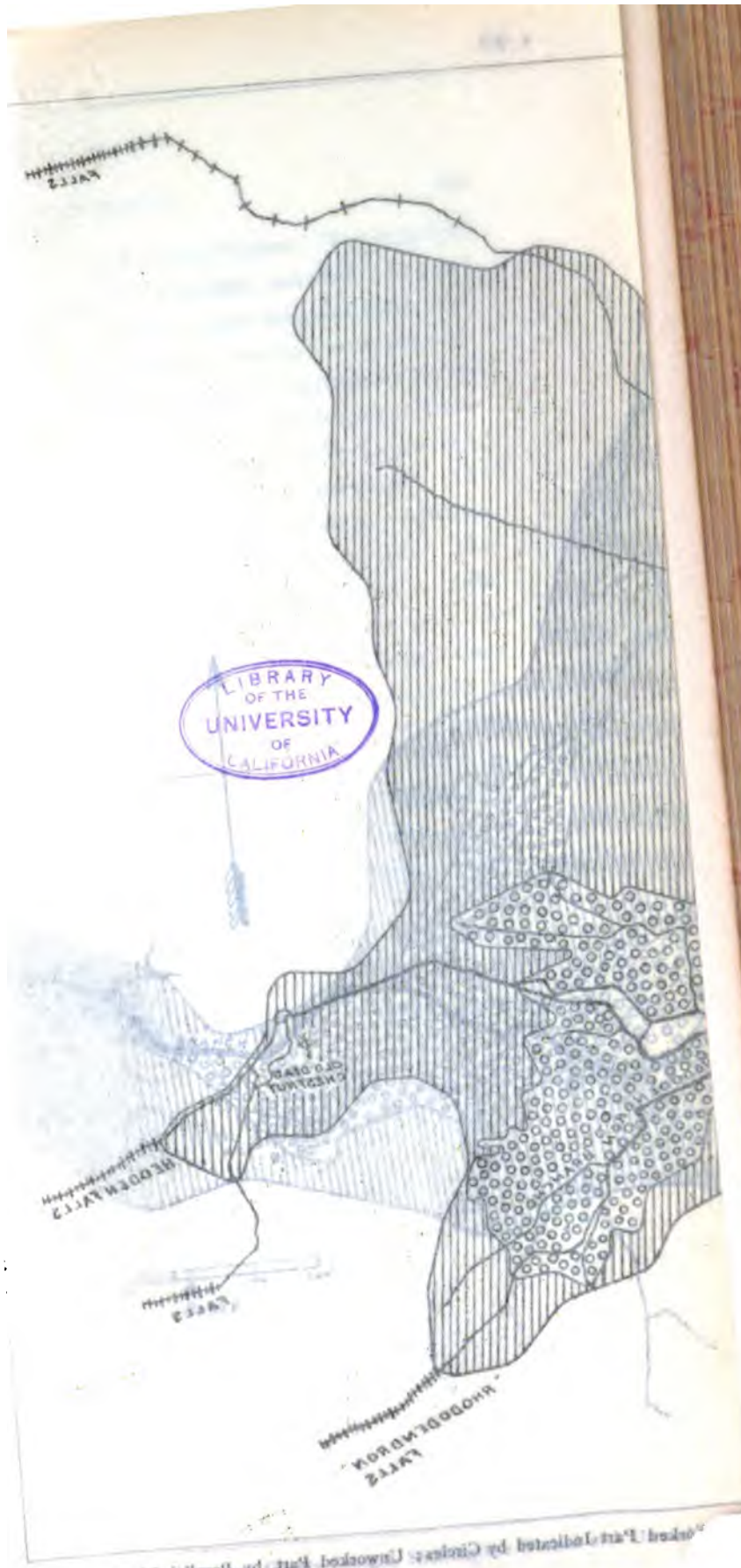
About a third of a mile down the road, on the south side of the ridge, a stream crosses the road, flowing west, but bending north immediately afterward. This comes from a southern extension of the ridge; and the stream, altogether, is not more than 500 yards, from its source to where it empties into Hedden branch, west of the road. This stream is known as "Gold Mine Run." East of the road, toward the ridge, it was worked, in conjunction with the Hedden mine; and it is said, that it yielded considerable gold.

North of the Hedden mine valley, along a small stream, work was done for some distance along the road, on what was then a part of the Hedden property. Piles of boulders are still to be seen.

THE LAMAR MINE

By S. W. McCALLIE, ASSISTANT GEOLOGIST

The Lamar Mine, located *on lot 30, 2nd district*, and now owned by Bidwell & Co., of Franklin, N. C., has been more extensively worked, and has yielded a greater amount of gold, than any placer in the eastern part of the county, with the exception, probably, of



Geological Map of California, showing the location of the University of California Library.



Map of the Hedden Place Mine, Rapin County, Georgia.
Worked and Unworked Part

the Hedden mine, described above by Prof. Yeates. The principal part of the work, on the Lamar lot, was done, between 1844 and 1858. Since then, there has been more or less irregular work carried on, from time to time, on the property ; but no systematic mining has been attempted. The old works, now overgrown by shrubs and trees of considerable size, occur along a small branch, a tributary of War-woman creek, which heads, at the base of Raven rock, in the high ridges, lying a short distance to the northeast. The placer is confined to the bed of the stream and its narrow bottoms, which, at no point, attain a width of more than 100 yards. The works extend along the branch, for more than half a mile, covering a total area of about 15 acres. Some of the area has been worked over, twice, with "long-toms" and "rockers," each time paying fair profits. The chief difficulty, encountered in working the mine, has been the lack of a sufficient amount of water, for sluicing purposes. If water could be conducted on the mine, with enough fall for hydraulic purposes, it is likely, that much of the old placer might be worked again, with profit. However, the expense of conducting the water on the mine would probably overbalance the profit, derived from working the deposit. A good deal of prospecting has been done, on the property, from time to time, with a view to locating the veins, that have supplied the placer ; but, so far, the efforts have been unsuccessful. That the gold is derived from auriferous veins, in the immediate vicinity, is quite evident, from the roughened appearance of the coarse gold, found in the deposit.

THE HAMBY PLACER

This placer, on *lot 43, 3rd district*, lies immediately north of the Lamar mine, and has probably been fed, by the same system of auriferous veins. The works, which were mostly done, many years ago, are confined chiefly to the bed of a small stream, known as the Hamby branch. The deposit is said to have been quite rich, in places, and to have yielded the miners good profits.

THE PAGE PROPERTY

The Page Property, *lots 44 and 45, 3rd district*, situated on the Chatuga river, near the mouth of Laurel creek, has had a considerable amount of placer-mining, along two different streams, viz: — Page's creek and the Law-ground branch. The works, on the latter, cover a total area, of about five acres, which has been reported, to have produced a large quantity of gold, much of it being in the form of nuggets weighing from five to twenty pennyweights. The auriferous gravel, which often forms beds, many inches in thickness, is frequently found on the hillsides, several feet above the present bed of the creek. The paying part of the placer, along the above mentioned stream, is now practically exhausted, unless unknown deposits are discovered, which does not appear probable; as the stream and its adjacent bottoms have been pretty thoroughly prospected. The amount of work, on the Law-ground branch, has not been so extensive, as that on Page's creek. However, judging

from the huge piles of gravel, it has also yielded considerable gold. A mile or so further up the branch, on lot 77, are to be seen the remains of other old placer-works, long since abandoned. Near by, on an adjacent hillside, are some vein-prospects ; but the outlook for locating a valuable gold-bearing vein, at that point, did not seem to be very encouraging.

Gold is reported to have been found on several other lots, in the 3rd district, but not in sufficient quantities, to be of any economic value.

THE BRIGHT EVANS PROPERTY

The Bright Evans Property, lot 82, 3rd district, is situated in the extreme southern part of the county, within a short distance of Tallulah river. Gold was discovered, here, some ten years ago ; and a limited amount of vein-prospecting was done ; but the work was finally abandoned, until a few months ago, when it was again renewed. The prospect is located on a steep hillside, near a small branch, at the base of Long mountain. At the time of the writer's visit, the principal excavation consisted of an open cut, about thirty feet long and twelve feet deep. In the cut, was to be seen a quartz vein, from ten to eighteen inches in thickness, dipping with the schist, the country-rock, to the northwest. The quartz contains more or less pyrite ; and, occasionally, it shows free gold. Samples of the ore collected for assay, give only a trace of gold. This is probably explained, by the gold's being in very coarse grains, and unevenly distributed through the quartz. Under these conditions, it is possible for the sample of ore, as a whole, to con-

tain a considerable amount of gold ; but, being unevenly distributed through the mass, it may be entirely absent, from so small a fraction of the sample, as an assay ton, even though it passed through an 80-mesh sieve.

SCREAMER MOUNTAIN

Some interest was manifested a few years ago, in the discovery of gold, in a small stream on a lot in the 2nd district, at the base of Screamer Mountain, now owned by Judge L. E. Bleckley; and also, on E. H. Allman's property and J. G. Welborn's property, *lots 19 and 21, 1st district*, a few miles northwest of Clayton. But none of these deposits proved to be of sufficient extent, to be profitable.

THE SMITH MINE

The Smith Mine, now owned by B. S. Graves, is located on *lots 103 and 104, 5th district*, about one mile west of Burton post-office. The works consist chiefly of placer-mining, which extends along Dick's creek and its tributaries, for about $1\frac{1}{2}$ miles, with a width, varying from a few rods to 200 yards. The auriferous gravel is confined, principally, to the creek bottoms. There are, however, two or three points, where the deposits occur, well up on the hillside, fully 30 feet above the present bed of the stream. Some of the richest deposits have thus been found, along the points of the ridges, or near the head of deep gulches. The gold, found in these eleva-

ted positions, is usually water-worn, showing, that it has been deposited, in its present position, when the stream flowed, at a much higher elevation. The manner of mining, on this property, has always been, of a primitive nature. It consists, in the use of the sluice-box, "rocker" and "long-tom," in washing the gravel, after the overburden has been removed, by pick and shovel. Placer-mining, by the use of the hydraulic giant, seems never to have been attempted in placer-workings, although Dick's creek furnishes sufficient water and ample fall, to be utilized for this purpose. At a comparatively small outlay, in constructing ditches, flumes and the necessary hydraulic plant, the entire old works, together with several acres of unworked placer, might be made to pay handsome returns, if judiciously managed. The overburden varies from three to eight feet in thickness.

The bed-rock consists of decomposed schists and gneisses, thus enabling the gold to be collected, without difficulty. The streams, flowing through the places, have sufficient fall, at all points, for drainage; and no trouble is experienced, in removing the water from the pits.

Vein-prospecting has been carried on, at various places on the Smith property, for many years; but no real vein-mining was attempted, until 1882. During this year, Capt. J. P. Willson, of Clarkesville, leased the property; and, erecting a ten-stamp steam-mill, he began mining operations. The vein, which was worked by Capt. Willson, is located, at the base of a hill, near the upper edge of the old placer. Mining was done, chiefly by means of a hydraulic giant; and the ore was sluiced to the mill, situated a short distance below, on the branch. The works were said to have continued, in successful operation, for only a few months; and they were finally shut down, on account of litigation. The mill has

since been removed, and no further attempt has been made, to renew the work. The only indication of these former workings, now to be seen, is a large open cut, about 100 yards long, from 10 to 40 feet deep, and 50 feet wide, together with one or two shafts and a tunnel. All these excavations were found to be so filled, with water, or fallen earth and decomposed rock, that it was impossible to examine the ore-bodies *in situ*. There is reported to have been discovered here, running parallel with the schists, a rich auriferous quartz vein, several inches in thickness. For reasons above stated, the writer was unable to verify these statements. However, he was shown, in the bed of the stream, a few yards away, on the strike of the vein, some quartz stringers in the schist, rich in gold, which are evidently off-shoots of the main ore-body. Still further to the northeast, on the same line of outcropping, on an adjacent hillside, a short distance from the placer-workings, is another excavation, of more recent date. There is exposed here, in a small open cut, a quartz vein, about three feet in thickness. The vein runs parallel with the schists, and dips, at a high angle, to the southwest. The quartz is massive, frequently more or less porous, and iron-stained; and, in places, it contains considerable pyrite. Other veins, on the property, have been similarly prospected; but none of the excavations are now accessible. The different veins, prospected, wherever examined, appear to show very encouraging results, and would seem to justify further development. The extensive placer, the numerous vein-prospects, and the admirable facilities for hydraulic mining, make the Smith property quite desirable, for mining purposes.

On the adjoining properties, owned by J. H. Derrick, A. J. Powell and W. T. Dickenson, are other placer and vein-prospects, of similar character. The placers occur along a number of

small streams ; but they have been only partly worked, on account of insufficiency of water. Some of the veins are reported, to have been worked, to a limited extent, many years ago ; but no reliable information was obtained, concerning either the character of the veins, or the nature of the ore.

THE STONESYPHER PROPERTY

The Stonesypher Property, lot 105, lies immediately south of the Smith property. It is traversed by Moccasin creek, along which, more or less placer-work has been carried on, from time to time. The total area of the placer-works covers some four or five acres ; and it is reported to have paid from \$1 to \$5 per day, per hand. Besides the placer-works, there has been considerable vein-mining, on the southern part of the lot, now owned by Mr. R. K. Reaves, of Athens, Ga. There is to be seen, here, along a hillside, several tunnels from 20 to 100 feet, in length ; and, also, a number of shafts, all of which were made, many years ago ; but they are now inaccessible. It is said, that, at one time, a number of hands were employed, at this mine, which is reported to have paid fair dividends. The stamp-mill, which was erected on Wild Cat creek, near by, has long since been removed ; and no attempt has been made, in recent years, to place the mine in proper condition, for examination. Mr. Reaves, who, in the last few months, has become the owner of the property, is now making arrangements, to open up the mine. At the time of our visit, he had just begun work, by exploring the old tunnels, and cleaning out the shafts ; but the work had not, then, progressed, to a sufficient extent, to

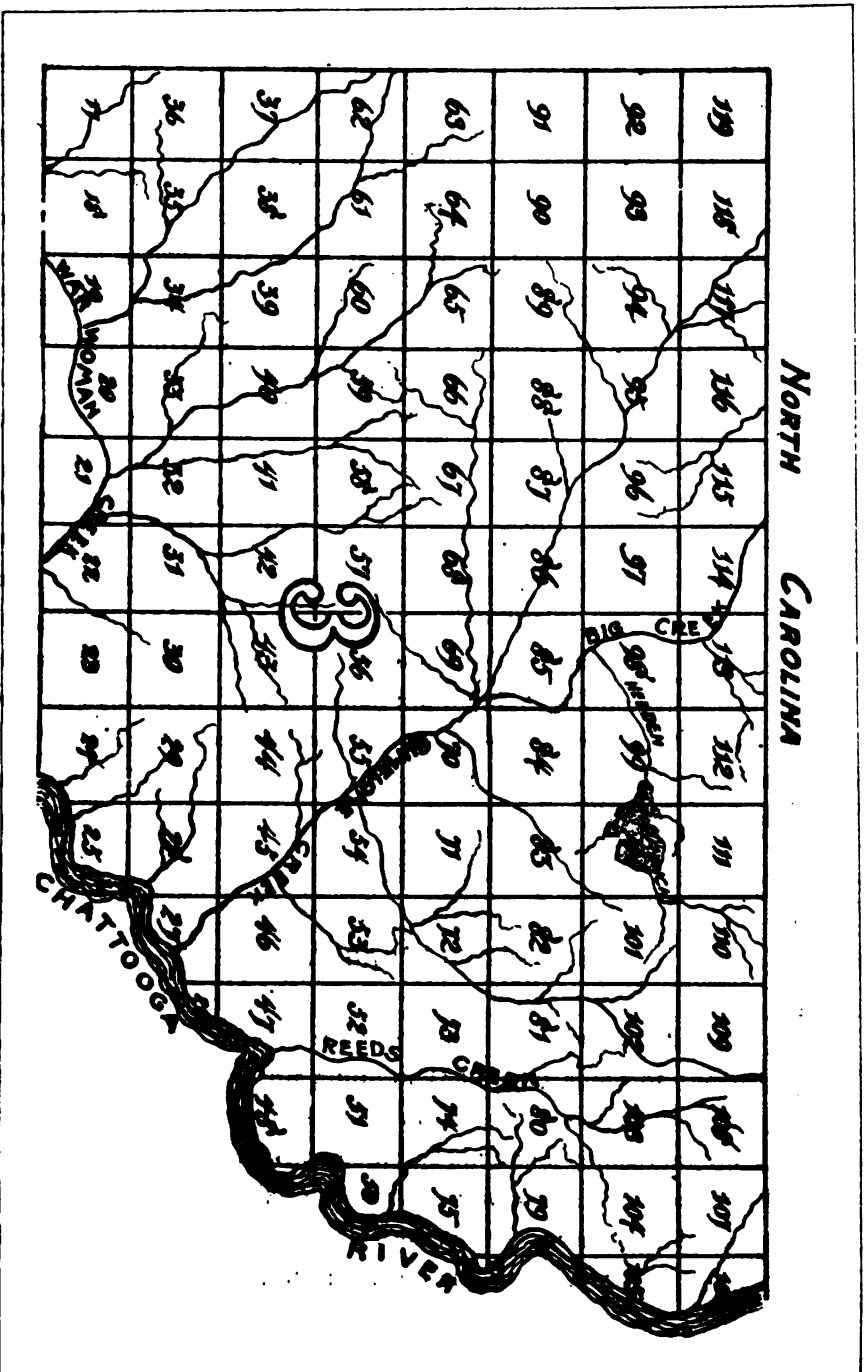
give any definite idea, of the extent and nature of the ore-bodies. The only opportunity, offered for an examination of the vein-material, was the few pieces of ore, scattered about the dump. These fragments showed, that the ore-bodies consist of reddish, porous quartz, frequently showing free gold, on their roughened surfaces. It is said, that the ore occurs in veins, of considerable size ; and it conforms in strike and dip, to the hornblende- and mica-schists, which constitute the country-rock. Ample water can be secured on the property, for mining purposes.

On the opposite side of Moccasin creek, near the summit of a high ridge, just back of the Stonesypher residence, are other vein-prospects. There occurs, here, a small open cut and a short tunnel, exposing a quartz vein, which varies from one to three feet in thickness. The vein dips, at a high angle, to the southeast; and it can be easily traced, for several rods, along its outcropping. The quartz has the usual characteristic iron stains; and, in places, it contains considerable pyrite. Some ore, from this prospect, was milled; and it is reported to have yielded \$7.00 per ton.

THE MOORE GIRLS' MINE

This mine is located on *lots 58 and 59, 1st district, Rabun county*. Gold was discovered here, some fifty years ago, by B. J. Patterson; but no work was done, until about eight years ago, when seven small cart-loads of the ore were taken from the vein, and milled on a small stamp-mill, erected on a branch, a short distance below the outcropping of the vein. From the above amount of ore, it is reported, that 22 pennyweights of gold were obtained, making an average of,

Fig. 5



Map of the Northeast Corner of Rabun County, Showing the Location of the Hedden Placer Mine on Lots 99 and 100, 3rd District.

Lower sheet on 1-12-30 and 100' topographic map of the Northwest corner of Reppun County showing the location of the Hagen

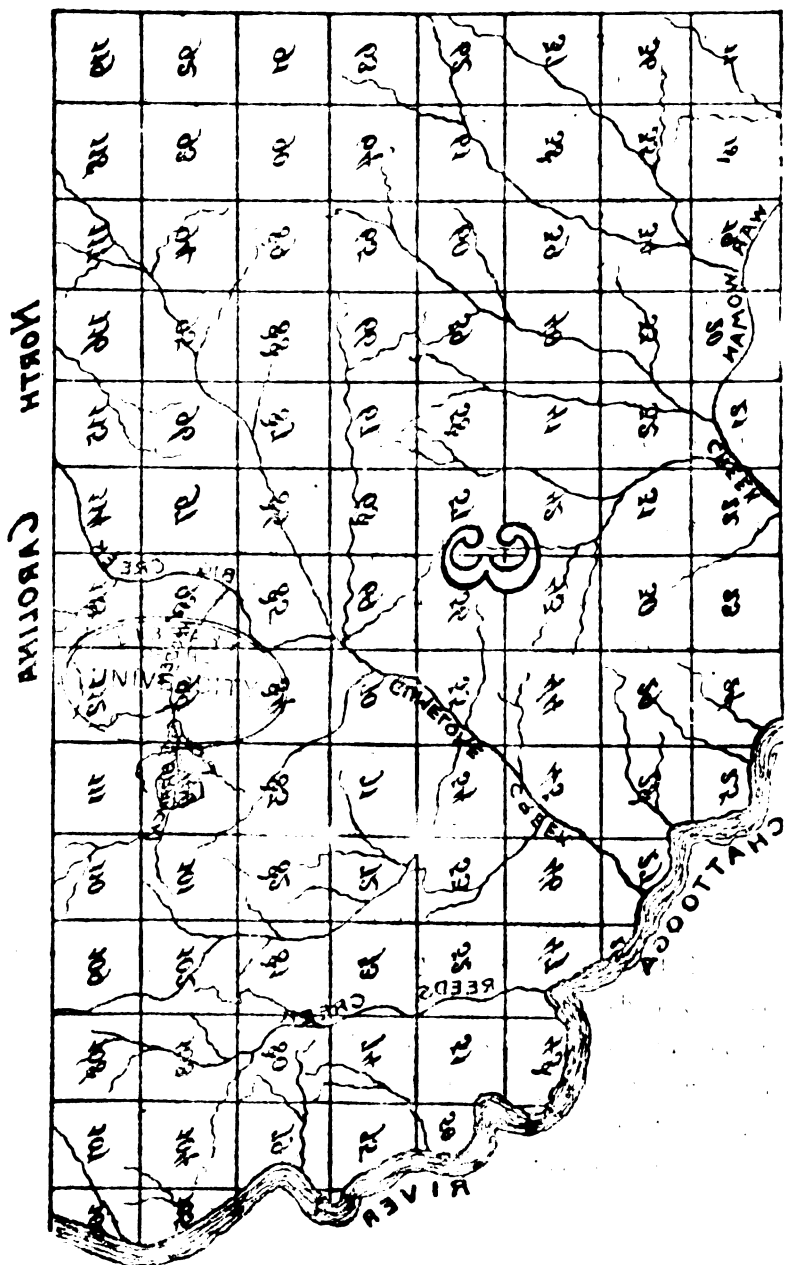


Figure 2

probably, \$3.00 per ton. An attempt was, also, made, to work, as a **placer**, the alluvial deposits, in the creek-bottom, at the base of the **hill**, on which the vein outcrops; but the enterprise proved **unsuccessful**, and the work was finally abandoned. A few years ago, **another** attempt was made to work the vein, and a considerable **outlay** of money was made, in conducting water on the mine, for **hydraulic** purposes; but this, also, proved unsuccessful; and it was **likewise** abandoned. Since our visit to the mine, it has been learned that a stamp-mill has been erected on the property; and that a third attempt is now being made, to work the vein.

The ore-body consists of a huge quartz vein, about thirty feet in width. It is made up of several layers, a foot or more in thickness, which, along certain lines, carry a considerable amount of pyrite and chalcopyrite. The vein strikes northeast and southwest, and can be traced, for some distance, along its outcropping. The country-rock consists of mica- and hornblende-schists, and is generally weathered, to a considerable depth.

Persimmon creek, a stream of some size, traverses the property, on which the prospect is located; and it could be used, for mining purposes, should further investigation prove the mine to be profitable.

THE H. W. BARTLEY PROPERTY

This property, lot 44, 1st district, adjoining the Moore Girls' property, was prospected for gold, in 1849; and some of the ore was milled. The excavations were all found to be inaccessible; and no satisfactory information could be obtained, concerning the nature of the ore-bodies. The property is now in the hands of Col. L. N. Trammell, of Atlanta, who, I understand, intends to have the lot thoroughly inspected, at an early date.

THE BLALOCK PROPERTY

On the Blalock property, a short distance above Burton Post-office, a small amount of work has been done, in the bed of Tallulah river ; but gold was not found, in sufficient quantity, to be mined at a profit, with the means then at hand.

The bed of the river is said to contain more or less gold, for some distance, both above and below Burton. It seems quite likely, that much of the bed of this stream might be worked with profit, if suitable machinery were used, and necessary judgment were exercised, in selecting the most valuable gravel deposits.

THE J. M. DILLARD PROPERTY

This property, consisting of *lots 190 and 191, 2nd district*, which lie in the Tennessee Valley, on the North Carolina State line, eight miles northeast of the Moore Girls' mine, was worked, as a placer, many years ago ; and a considerable amount of gold is reported, to have been obtained. Search for the vein has been made, from time to time, on the property ; but, so far, no ore-bodies of economic importance have yet been discovered.

THE AMMONS BRANCH MINE¹

The Hall County Belt first makes its appearance, within the State, in the northeastern corner of Rabun county, *on lot 110, 3rd district*, where a limited amount of placer-work was done, many years ago. Just across the State line, in what is called Horse Cove, North Carolina, a great deal of placer-work has been done. Only a few months since, a rich ore-shoot was struck here, and several hundred pennyweights of gold were taken out, in a short time. This prospect was visited and carefully examined, in order to obtain all the information possible, concerning the mode of occurrence and the nature of the ore-bodies, of the above gold belt. This prospect is now called the Ammons Branch mine, and is situated only about $1\frac{1}{2}$ miles beyond the State line. The writer is informed, that there is a dispute, about the State line, at this point ; and that a part of the Horse Cove district probably lies within the Georgia limits. When the prospect was visited, in August, 1896, the work consisted of an open cut, 50 feet long and from 10 to 20 feet deep. The excavation is located on a steep hillside, a short distance from a small branch, which has been extensively worked, for its placer deposits. The vein, exposed here, consists of iron-stained quartz, varying from a few inches to two feet in thickness ; and, in places, it shows much free gold. Samples of the ore, from the vein, weighing several ounces, were seen, the greater part of the masses being free gold, in the form of imperfect crystals. Up to the time of the writer's visit to the property, if current reports can be relied upon, there had been taken, from the excavation, about ten pounds of gold.

¹ The description of this property is included ; as a correct location of the State line may prove, that it lies in Georgia.

The vein occurs in a garnetiferous gneiss, within a few rods of a large mass of coarse-grained granite, containing large, irregular pieces of feldspar. The granite seems to be an intrusive mass, and appears to be intimately connected with the auriferous vein. In a few instances, pyrite was noticed in the quartz; but it is of rare occurrence. However, it will probably become quite abundant, at the depth of 40 or 50 feet, the water-level. The country-rock, together with the vein, dips, at a high angle to the southeast, and strikes N. 20° E.

CHAPTER IV

HABERSHAM COUNTY

BY S. W. McCALLIE, ASSISTANT GEOLOGIST

HABERSHAM COUNTY is traversed by both the Dahlonega and the Hall County gold-belts. The former occurs in the extreme north-western part of the county, while the latter reaches its greatest development near the center of the county, a few miles west of Clarkesville. The eastern and western belts seem not to be well defined. On the contrary, they appear to overlay or merge into each other, in places. The distance separating the workable mines of the two different belts, is, however, several miles; and they may be taken, for our present economic purposes, as the limits of each respective belt. The character of the rock, occurring within the gold-belts, is similar to those found in Rabun county. They consist of hornblende- and mica-schists, gneisses and granites. The latter is often found in huge masses; but, more frequently, it occurs in the form of pegmatitic veins, interlaminated with the gneisses and schists, and cutting them at various angles. It was noted, as a general rule, that the auriferous veins, examined, in both belts, were often associated with, or located near, these pegmatitic veins, although the wall-rock was itself generally found to be gneisses or schists. This association seems to indicate, that the pegmatitic veins are intimately connected, in some way, with the gneisses of the ore-bodies.

All the gold-bearing veins, examined, in the county, with one exception, conform, in strike and dip, to the country-rock, and vary greatly in thickness, being, more properly speaking, a series of quartz lenses or ore-chutes, connected by narrow quartz stringers. The veins are generally made of porous iron-stained quartz; and, where not affected by atmospheric agencies, they contain more or less pyrite.

The exception to the parallelism of country-rock and vein, above referred to, occurs on the Willbanks property, *lot 51, 11th district*, 7 miles north of Clarkesville. The auriferous vein here cuts the country-rock, at almost right-angles. It was found impossible to determine, from the limited out-cropping here exposed, whether this is a so-called true fissure-vein, or only the filling, with quartz, of a transverse joint, in the schist.

THE NICHOLS MINE

This mine is located *on lots 92 and 120, 12th district*, about 6 miles east of Clarkesville. Gold was first discovered, on this property, by A. J. Nichols, its former owner, about 1840. Since then, irregular placer-mining has been carried on, from time to time, and a considerable quantity of gold has been obtained. The various estimates, as to the total output of the mine, differ greatly. However, from the most reliable information, secured from various parties, who have been acquainted with the mine, for many years, it seems to be quite evident, that the entire yield of the placer, from its earliest workings to the present, has been at least 20,000 pennyweights, and probably twice, and even three, times that amount. The gold,

obtained from the placer, commonly occurs in fine particles, though nuggets, weighing 225 pennyweights, have been found. It runs from 75 to 80 per cent. fine, the impurity being chiefly silver. The old works, which cover an area of about five acres, are located along a small branch, that takes its rise on the property. The richer part of the placer seemed to be confined, mainly, to the narrow bottom along the stream, where the alluvial deposits, consisting of water-worn gravel and clay, have a thickness, varying from three to eight feet. The adjacent hill-slopes, on either side of the branch, have been worked several feet, along the bed of the stream, in places; and they are reported to have yielded gold, in paying quantities. All the workable placer appears to be, now, practically exhausted, and the value of the property, for mining purposes, seems to depend largely on the location of paying veins. Along the hill-side, near the placer works, are to be seen several excavations, consisting of shafts, open cuts and short tunnels, made with a view to locating the veins, that supplied the stream below. All the excavations expose quartz-veins; but none of them carry gold, in sufficient quantities, to be of economic value. The veins are mainly made up of iron-stained quartz, which, in places, contains numerous imperfect radiating, or interlocking, crystals of the same material, which give, to the vein, a beautiful comb-like structure. The fragments of vein material, adhering to nuggets, found in the deposits, along the branch, are said to consist of granular iron-stained quartz. Diligent search has been made, to locate the vein, carrying material of this nature; but, so far, all efforts have been futile.

The country-rock consists of gneiss and schists, much contorted, and interlaminated, or traversed, by numerous pegmatitic veins. The prevailing dip is to the southeast, and the strike, northeast and southwest.

One of the chief difficulties, encountered in working the property, has been the lack of water, for mining purposes. This, however, can be overcome, by constructing a ditch to Deep creek, some four miles. The creek is of ample size, to furnish water, sufficient to carry on extensive mining operations; and, should valuable ore deposits be discovered on the property, there is no doubt, but that the ditch will be constructed, and thus enable the quartz to be milled, in close proximity to the ore-bodies.

THE LA PRADE PLACER

The La Prade Placer Mine is situated *on lot 135, 11th district*, at the base of Tallulah mountain, about ten miles north of Clarkesville. Gold has been known to occur here, ever since 1840; and, at times, very active mining operations have been carried on. The works, which are located at the junction of two small streams, tributaries to Soquee river, cover an area of about three acres. From this small placer, it is claimed, that between 20,000 and 30,000 pennyweights of gold have been obtained. Several nuggets are reported to have been found, one of which is said to have weighed three and a half pounds. The deposit consists of heavy beds of gravel and water-worn boulders, overlain, by a thin layer of earth, washed from the adjacent hillside. The paying part of the placer seems to be now pretty well exhausted. However, it is not at all improbable, that other deposits may yet be discovered, on these streams. A limited amount of vein-prospecting has been done on the hillside, in the vicinity of the placer; and some quartz veins have been exposed; but none of them have carried sufficient gold, to pay for working.

GOLD DEPOSITS OF GEORGIA



PLATE 171



THE C. T. WILLBANKS PROPERTY

This property, *lot 51, 11th district*, was prospected for gold, some years ago. There is to be seen here, in a shaft twenty feet deep, a quartz vein, having an average thickness of about 20 inches, and cutting the country-rock, at almost right-angles. The quartz is porous and iron-stained, and has all the appearance of being a fair quality of ore. However, an assay showed only a trace of gold.

THE T. G. EDWARDS PROPERTY

This property, consisting of *lot 147, 3rd district*, located on the Chattahoochee river, was prospected for gold, about seven years ago. There was a considerable amount of gold found on the property; but not enough to justify further mining operations. It is thought, by some prospectors, well acquainted with the river-bed, in this vicinity, that it contains considerable quantities of gold, and would probably pay to mine, if suitable machinery were used.

T. S. BEAN'S PROPERTY

This property, and the adjoining town-lot, now owned by Judge L. E. Bleckley, of Atlanta, both of which are within the corporate limits of Clarkesville, have been prospected, to a limited extent, for gold; but neither has yielded a sufficient quantity of the yellow

metal, to encourage systematic mining. The gold occurs in the alluvial deposits, along a small stream, flowing through the eastern part of the town. The deposit covers only a small area, and does not carry sufficient gold to be of economic interest. A small amount of vein-prospecting has been carried on, in the immediate vicinity, with the hope of locating auriferous veins; but, so far, the efforts have been unsuccessful.

OTHER PROPERTIES

In the extreme northern part of the county, *on lots 20 and 22, 13th district*, and, also, *on lot 69, 6th district*, are small placer workings, near the headwaters of the Soquee river. The deposits, confined chiefly to the beds of the streams, have been worked, from time to time, since 1853; and they have produced several hundred pennyweights of gold; but the paying parts of these deposits seem, now, to be exhausted. There has also been a limited amount of placer-mining, on the Waters and the Warford properties, in the eastern part of the county, near Currahee mountain. These deposits were neither rich nor extensive; and they have long since been abandoned.

CHAPTER V

TOWNS COUNTY

By S. W. McCALLIE, ASSISTANT GEOLOGIST

So far, in only two localities of this county, has gold been found, in sufficient quantity, to pay for working. Each of these localities is quite limited in area; and they have, apparently, no connection with each other. One lies in the eastern portion of the county, near Visage, and the other, in the extreme northwestern corner, in the vicinity of Welsh.

In the eastern portion of the county, which is very mountainous and rugged, placer-mining for gold has been carried on; notably at a few places, near Hightower creek and its tributaries. These workings have, generally, received the name of the original owner of the land; and they are always, locally, called "mines." However, the term, "prospect," in some cases, at least, would appear to be a more suitable name.

The streams of this region are numerous and rapid, traversing narrow, fertile valleys. Many of these valleys, with the adjacent mountain-sides, still retain a remarkably fine virgin forest, of poplar and the various species of hardwoods. The geological formation is completely crystalline, and rarely shows any evidence of a clastic origin. Mica-schists and gneisses, cut by pegmatitic veins, soapstone and other magnesian rocks, all much folded and contorted, make up the underlying geological formations, whose structural relations are difficult to make out.

THE NEWTON MINE

This mine is located in the *18th district of Towns county, on lot 131*. It extends along both sides of a small stream, which enters Hightower creek from the east. The worked portion of the mine covers an area of less than three acres, and lies in a narrow hollow, formed by the foot-hills, that lead down, from the main ridge, to within a few yards of the creek.

Gold is said to have been discovered here, many years ago, by Joseph Eller. His attention was first attracted, by some water-worn gravel, which his dog had exposed, while making an excavation for a burrowing animal. This led to an examination of the gravel deposits, beneath the overlying soil; and they were found, to be rich in gold. The work of washing the gravel was begun, immediately, by Eller, assisted by others; but, owing to the want of a sufficient amount of water, the work progressed slowly. The gravel, frequently, had to be carried, some distance, to running water. However, regardless of this difficulty, it is said, that the mine paid handsomely.

In 1872, Bush & Lyons leased the property, and operated the mine, for about two years. To secure the necessary water for washing, hydraulicking and sluicing purposes, they constructed a ditch, nearly a mile in length. This ditch conducted the greater part of the Chastain branch to the mine, and enabled them to operate one small hydraulic giant. With this equipment, they were able to work, successfully, much of the gravel, in the lower part of the hollow; but it was impossible to secure any reliable information, as to the amount of gold, taken out, during the time of the lease.

After the expiration of this lease, Nicholson & Sons worked the

mine, irregularly, for about five years, when it fell into the hands of McIntosh, who, with a number of hands, operated it, for nearly a year. McIntosh had a second ditch dug, two miles in length, which, on account of its connection with the Chastain branch, near its source, carried much less water, than the old ditch; but it gave an increase in fall, at the mine, of nearly a hundred feet. Parts of the mine, heretofore unworked, by reason of their elevation, together with certain portions of the old works, are said to have been worked, at this time, with profit.

Fig. 6

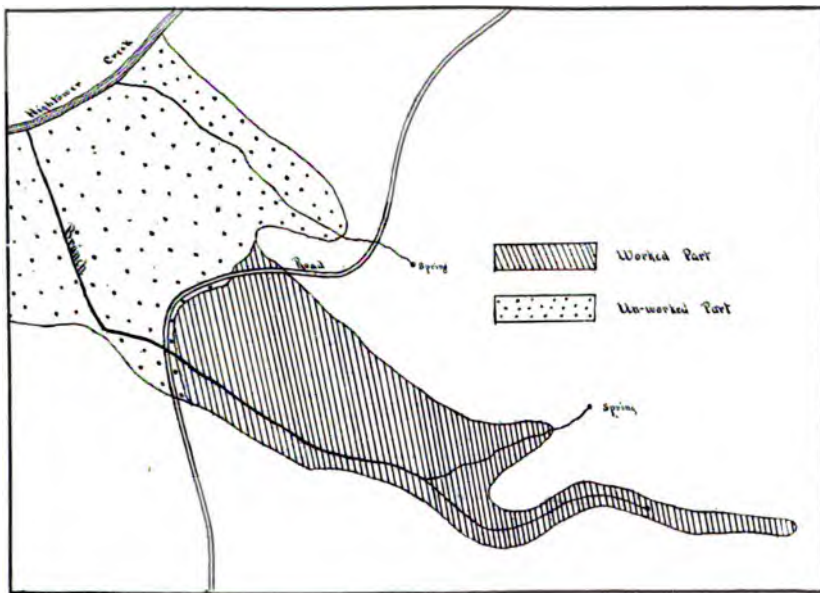


Diagram Showing the Present Condition of the Newton Placer Mine, Towns County, Georgia.

At the time of our visit, a new company, consisting mainly of Western men, had recently been organized for the purpose of operating this mine. They had secured, under certain conditions, both

a lease and an option on the property, for a number of years. It was the intention of the Company, to work that portion of the mine, lying between the creek and the old works,¹ which had, thus far, been neglected, on account of the difficulty in drainage. Furthermore, they proposed, to re-work certain parts of the old works, and in the meantime to locate, if possible, the veins, which fed the placer. The firm had just completed a ditch, three quarters of a mile long, to the Chastain branch; it was much larger than any ditch, previously constructed on the property, and of sufficient size, to conduct the entire stream over the mine. They were thus ready to commence mining, on a more extensive scale, than had, hitherto, been carried on, in the locality. But, unfortunately, at this stage of the work, there originated a misunderstanding among the members of the company; and, as a result, the outlook for carrying on successful mining operations did not appear to be very encouraging.

The gold, found here, is usually coarse, varying in size from a fraction of a grain to nuggets, weighing from fifteen to twenty pennyweights. The larger pieces are generally quite rough; and they show evidence of little transportation.

The vein, from which the gold was derived, although frequently sought for by miners, has not, yet, been located. There can be but little doubt, however, by reason of the topography of this locality, that the vein intersects the hollow, at some point, near the old works. This opinion, as to the source of the gold, is also strengthened, by the occurrence, in the hollow and along the hillsides, of numerous loose, angular quartz rocks, which frequently contain iron-stained cavities, and occasionally particles of gold.

From the most reliable information, which could be obtained, it appears, that between five and ten thousand pennyweights of gold

¹ See diagram, p. 109.

have been taken from the mine, since it was first discovered. The amount of gold, still remaining in the placer, is, at present, a mere matter of speculation. Nearly all the unworked portion of the mine lies in a boggy bottom, near the creek; and it will have to be drained, by means of long ditches, eight or ten feet in depth, before it can be successfully worked. If the reports, concerning the test-pits, which have been made here, can be relied on, there seems to be no reason, why this part of the mine cannot be profitably worked.

THE CHASTAIN BRANCH MINE

The Chastain Branch mine is located *on lot 136, 18th district*; and it lies immediately south of the Newton property. It was discovered, about the same time, as the Newton mine; and it has probably pro-

Fig. 7

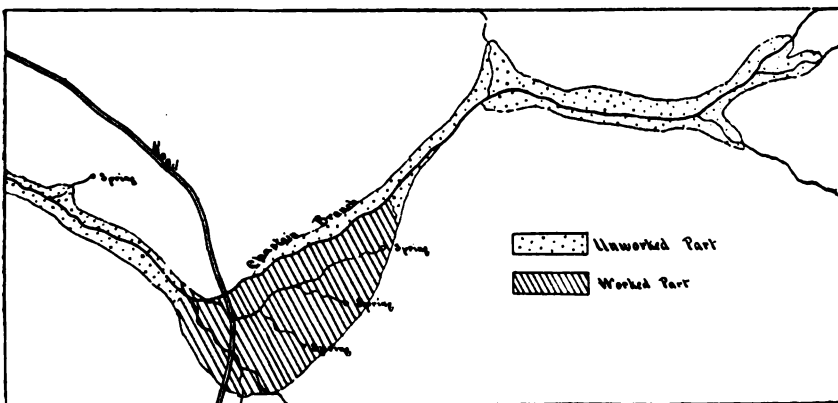


Diagram Showing the Present Condition of the Chastain Branch Placer Mine,
Towns County, Georgia.

duced an equal amount of gold. The area, over which the old works extend, is somewhat larger, than the worked portion of the adjoining property; but the depth of earth and gravel, overlying the bed-rock, is not so great. This, together with the abundance of water-power, furnished by the Chastain branch, for sluicing and washing, has enabled persons to work the mine, at comparatively little expense.

A few test-pits, sunk near the branch, indicate, that there is a narrow strip, both below and above the old works, which may still be worked with profit. The character of the gold is very similar to that, found at the Newton mine; and, undoubtedly, it has originated, from the breaking down of parts of the same veins.

THE SMITH MINE

This mine is located, one and a half miles northeast of the Newton property, *on lot 94, 18th district.* The placer work has been confined, here, to a narrow strip, not over a hundred feet in width. It extends, for about one hundred yards, along a small stream, which enters Hightower creek, from the west. The mine is reported to have paid the miners, on an average, less than 75 cents per day. All the gold-bearing gravel seems to have been worked out, with the probable exception of that, underlying a small boggy area, near the junction of the stream and the creek.



PLACER-MINING ON COOSA CREEK, NEAR BLAIRSVILLE, UNION COUNTY, GEORGIA.



THE WILLS CREEK PROPERTY

On this property, *lot 102, 18th district*, a limited amount of placer mining has been carried on. Gold was said to have been discovered, here, more than forty years ago; and to have been first worked, by a miner, named Woods. The deposit, in places, is reported to have been very rich, some ten-foot pits paying, as much as sixty pennyweights. The works are located near the head of a narrow hollow, and cover an area, of less than half an acre. Only in this limited area, has gold been found, in sufficient quantities to pay for working.

Besides the above described localities, there are numerous other places, where gold occurs, in this portion of the county; but, in no other places, as far as known, in sufficient quantities, to be of any economic value. The distribution and mode of occurrence of gold, in this region, indicates, that it originated, from the breaking down of a number of veins. These veins appear, to have become greatly enlarged, only at a few points in their course, where they formed rich pockets, that supplied gold to the workable placers.

In the extreme northwestern portion of the county, near Welsh post-office, a number of small gold-bearing quartz veins have been discovered. They seem to be the southern terminus of a more or less well-defined belt, fully two miles in width, extending into the State, from North Carolina. The portion of the county, where these gold-bearing veins occur, is not so rugged or mountainous, as the eastern portion, though it is equally well-watered, and is made up, of similar geological formations.

THE MURDOCK VEIN

This property, now owned by the Hiawassee Gold Mining Company, is located *on lots 32 and 42, 17th district, Towns county*. Gold was first discovered, here, in float-quartz, in 1856, by A. B. Patton, while plowing in a field, where the vein was subsequently located.

A miner, by the name of Murdock, assisted by a few hands, began mining on this property, in 1859, and continued, with a considerable degree of success, for about three years, when the mine was shut down, on account of the late war. Under Murdock's management, the vein was worked, for nearly a hundred yards, to a depth of thirty-five feet. Much of the ore, taken out, during this time, is said to have been very rich in free gold. It was milled, near by, on a small stream, by means of an arrastre, a primitive mill, consisting of a vertical axis, with a horizontal arm, to which, in this case, was attached a large flat boulder, that was dragged over the ore, placed on a bed of flat stones, within a circular box. This mode, of extracting the gold from the quartz, was exceedingly slow, and, necessarily, more or less imperfect; but, nevertheless, it is claimed, that the mine, on account of the high grade of the ore, paid a fair profit.

In 1871, Perry Ellis obtained control of the property, on which the Murdock vein is located. He replaced the arrastre with a ten-stamp mill, and operated the mine, for three years, at the end of which period, it passed into the hands of J. B. Puett. The mine was worked, though not continuously, by Puett, for six or seven years, and was finally sold by him, in 1884, to the Hiawassee Gold Mining Company. At the time of our visit, this company was perfecting arrangements, to renew mining operations on the property.

The Murdock vein is what is known, as a true fissure vein; it cuts the mica-schist, or country-rock, at nearly right-angles. The strike is almost due northwest, while it dips, at a high angle, to the northeast. The vein varies, in thickness, from six inches to two feet; and it may be traced, with a considerable degree of certainty, for a quarter of a mile. In places, it is much fissured and broken, as if it had been subjected to a great crushing force. The quartz is more or less iron-stained; and it frequently contains cavities, in which free gold may be seen. The country-rock is so completely decomposed, even at the bottom of the deepest shafts, that the ore can be mined, at comparatively little expense.

One hundred and fifty feet west of the Murdock vein, is another gold-bearing quartz vein, eight inches in thickness. It runs parallel with the former; but, on account of its small size, it has been prospected, only to the depth of a few feet. These veins are located near the north end of a low, flat ridge, which slopes, gradually, to Brasstown creek, and a lesser stream, entering it from the west. Both of these streams are rapid; and they furnish ample water, during the greater part of the year, to run stamp-mills, with from five to twenty batteries.

LOT 43, 17TH DISTRICT

On lot 43, 17th district, owned by E. R. Brown, and lying immediately east of the property, on which the Murdock vein is located, a limited amount of prospecting has been done; but no gold-bearing veins, of any size, have, yet, been found, to justify their development. Angular fragments of gold-bearing quartz, of consider-

able size, are frequently met with, on this lot. They appear to have originated from the breaking down of veins, near by.

THE STRUBY PROPERTY

One mile south of Welsh, *on lot 67, 17th district*, some work was done, in 1870, for gold, on the Struby Property. The prospecting consisted of a tunnel, driven into the hill, to a distance, of about one hundred feet, and a number of shafts and cross-cuts, of various depths. It is reported, that several tons of ore were taken from these different openings, which were afterwards milled by J. B. Puett. The ore is claimed to have been of fair quality; but, owing to the small size of the gold-bearing quartz vein, it could not be mined with profit.

At the time of our examination of the property, all the excavations had so fallen in, that it was found impossible, to make any satisfactory examination. Only in one place, was the vein exposed to view. It varies, here, in thickness, from twelve to eighteen inches, and corresponds, in strike and dip, to the country-rock.

THE MALDEN PROPERTY

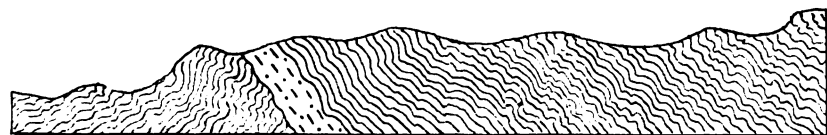
On the Malden property, *lot 99, 17th district*, one mile west of Young Harris, a small fissure vein of gold-bearing quartz was discovered, a few years ago. When examined by us, it was exposed only in two shallow pits, near the road. At these points, it has an

average thickness of about six inches, and cuts the mica-schist, at nearly right angles. Nothing definite could be ascertained from the limited exposure, in regard to the extent or general character of the vein. The strike and dip correspond very closely, to that of the Murdock vein. An ore sample was taken by the writer; and it yielded the following result, in the laboratory of this Survey:—
Ore sample, Malden property, .125 oz. (\$2.50) of gold per ton.

THE NANCY BROWN MINE

This mine is located *on lot 34, 17th district*. There appears, here, a more or less continuous gold-bearing vein, extending diagonally across the northwest corner of the lot, parallel with the strike of

Fig. 8



Cross-section through the Nancy Brown Gold Mine, Towns County, Georgia, Showing a Fault adjacent to the Auriferous Quartz Vein.

the mica-schist. It varies greatly, in size, and in the character of the ore, at the various exposures. At the opening, furthest north, near the small stream, which flows from the east across the lot, the vein is from three to five feet wide, and is made up, of numerous thin layers of quartz, interlaminated with mica-schist; while at the opening, furthest to the south, it consists of a compact, milk-colored quartz, from eighteen to twenty inches, in thickness. The

dip of the ore-body correspond to the country-rock; but, at some of the exposures, there occurs an unconformity between the overhanging and foot walls, that is evidently due to local faulting.¹

Williams & Pruett began mining operations, on this property, in 1874, and worked the mine, though not continuously, for about four years. During this time, several tons of ore were taken out, and hauled two miles to a stamp-mill, which had been erected by Perry Ellis, near Welsh. This ore is said to have milled, on an average, \$18.00 per ton, and was taken from the north exposure of the vein, where a tunnel, several yards in length, was driven into the hill, along the vein at water-level. Below this level, the vein is said to continue, at its usual width and richness; but, owing to inadequate drainage and the falling in of the tunnel walls, it was found impracticable, with the means then at hand, to prosecute the work further.

In 1882, eight years after Williams & Pruett abandoned the mine, some prospecting was done on the vein, about two hundred yards south of the old works. Here, it is claimed, a very rich pocket was found, containing much coarse gold, which was worked to the depth of twenty feet, the water-level. There are a number of other pits and cross-cuts along a line, corresponding with the trend of the vein; but all have caved in, except the recent cut and tunnel, at the most southern exposure, where the vein, as stated above, is composed of a compact, milk-colored quartz, dipping with the mica-schist, at a high angle, to the southeast. The tunnel, which is a continuation of the open cut, extends into the hill, only about twenty feet. The vein, throughout its entire exposure, here, has a well defined wall of black hydro-mica slate, from eight to ten inches thick.

A number of samples, from this mine, were taken by the writer,

¹ See cross-section, p. 117.

which, assayed, in the Survey laboratory, gave the following results: —

1. Ore sample, Pit No. 110 oz. (\$2.00) of gold per ton
2. Ore sample, Pit No. 5 Trace only of gold
3. “ “ “ “ 705 oz. (\$1.00) of gold per ton
4. Ore sample, Pit No. 7125 oz. (\$2.50) of gold per ton
5. Ore sample, Pit No. 7125 oz. (\$2.50) of gold per ton
6. Ore sample, Pit No. 8075 oz. (\$1.50) of gold per ton

LOT 3, 17TH DISTRICT

On lot 3, which lies immediately north of the Brown property, and which is known, locally, as the “Old Field,” considerable work has been done, on a vein, that seems to be a continuation of the vein, which occurs on the adjoining lot. Prospecting was begun here, by Perry Ellis, as early as 1869; and, on account of the favorable surface indications, more or less work has been done, on the property, by various parties, nearly every year, since. Numerous shafts and pits, varying from ten to fifty feet in depth, with a number of short tunnels, have been made, with a view to locating the vein, from which the rich float ore, scattered throughout the field, was derived; but, so far, the prospecting has met with only partial success. At only a few places, was the vein located; and here it was found to be too small or too barren, to be worked with profit.

The ore, found on the surface, and scattered through the soil, is quite abundant; and, in places, several tons may be seen, heaped together in piles. It consists of brownish or reddish-colored quartz

bowlders, of various sizes, frequently somewhat granular, and containing iron-stained cavities, with more or less pyrite, in which particles of free gold may sometimes be detected. There was no opening on the property, where the ore could be examined *in situ*; but, near by, in the northwest corner of lot 34, scarcely twenty feet from its divisional line with lot 3, a vein, which is said to be the same, as that prospected on the latter lot, was examined. The vein, here, is exposed in an open cut, to the depth of about twelve feet. It consists of a quartz vein, twelve inches wide, carrying free gold, and conforming in dip and strike, to the folded and contorted country-rock.

The lack of sufficient water, to operate these prospects, seems to account, to a great extent, for their present undeveloped condition. Two small streams take their rise, on lot 34; but neither furnishes enough water, to be of any economic value, in mining. It is possible, nevertheless, by digging a ditch, two or three miles long, to conduct a branch of Brasstown creek to the lots, which would furnish ample water, to run a stamp-mill, and which could, probably, be used, in hydraulic mining.

THE HORSE VEIN

The Horse Vein, which is located in the *southeastern portion of lot 1, 17th district*, was visited; but all the old pits were so filled in, that it was found practically impossible, to make any satisfactory examination of the vein. The prospecting has been limited, to some four or five pits, none of which appear to have been originally over fifteen feet in depth.



GROUND-SLUICING AT THE COOSA CREEK PLACER-MINE, NEAR BLAIRSVILLE, UNION COUNTY, GEORGIA.



LOT 2, 17TH DISTRICT

Many years ago, some placer mining was done by Mr. Kinsey, with slave labor, on a small stream, *on lot 2*, a few hundred yards north of where the vein was afterwards prospected. It is said, that he extracted, in a short time, as much as \$1,200 worth of gold from the gravel covering a very small area.

CHAPTER VI

UNION COUNTY

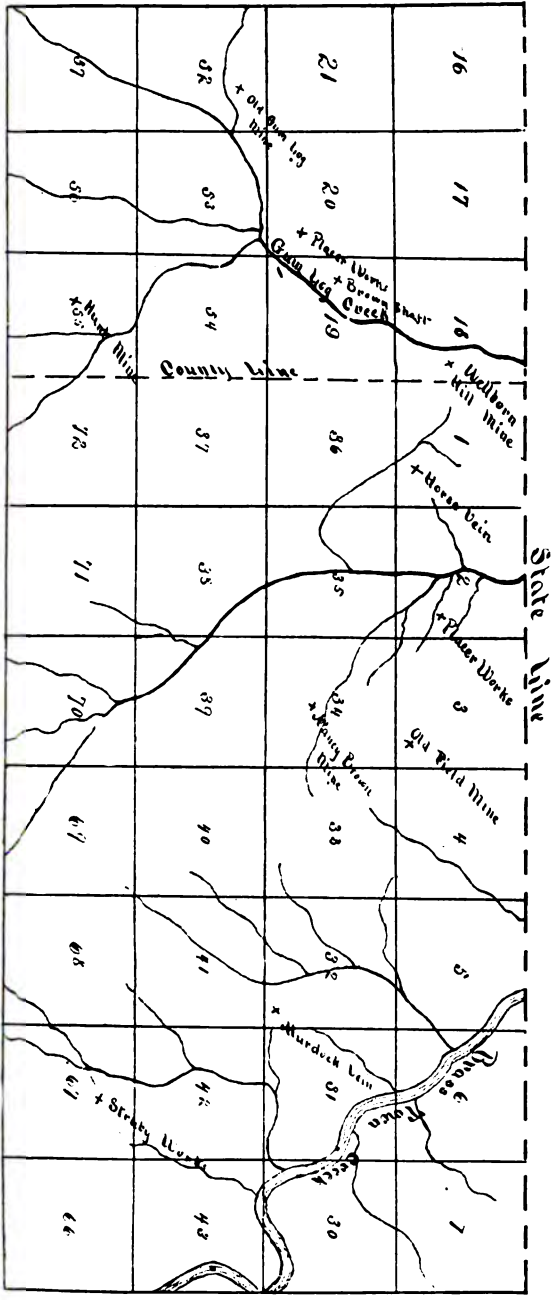
BY S. W. MCCALLIE, ASSISTANT GEOLOGIST

The gold-bearing belt, that traverses the northwestern portion of Towns county, extends, for a short distance, into Union. The auriferous veins make their appearance, in the extreme northeast corner of the county, and continue, with frequent interruptions, through a number of lots, lying to the southwest. This section is hilly, but well-watered, by numerous small streams, that traverse narrow fertile valleys, which yield excellent crops of corn, rye etc.

THE WELLBORN HILL MINE

This mine, now owned by the Chattanooga and Gum Log Mining Company, is situated in the southeast corner of *lot 18, 9th district*, within a short distance of Gum Log creek. Some prospecting was carried on, here, shortly after the war; but no systematic work was attempted, until 1883, when the property fell into the hands of the present owners, who spent a considerable amount of money, in developing it. The Company finally abandoned the work, in 1889.

Fig. 9



Map of the Northern Adjoining Corners of Towns and Union Counties, Georgia, Showing the Locations of the Principal Gold Mines in the Included Territory.

The main parts of the work are near the summit of a low ridge; they consist of a main shaft, one hundred and thirty-five feet in depth, with two drifts at the eighty-five foot level, one extending north, one hundred and ten feet, and the other, southwest, one hundred and fifty feet. These drifts are said to have followed up a gold-bearing quartz vein, that, in places, yielded a high-grade ore. It was impossible to examine the vein, either in the main shaft or in the drifts, on account of the water; but, in a second shaft, seventy-five feet west from the main shaft, and extending down to the southeast drift, the vein was exposed to view. It has a thickness here, of eighteen to twenty-four inches, and consists of a light-colored, somewhat granular quartz, with numerous iron-stained cavities. The dip of the vein which corresponds to that of the country rock and gneiss of the country, is to the southeast, 127°. It is only a few degrees from the perpendicular. At the base of the shaft, about three hundred yards northeast of the main shaft, a tunnel, one hundred and twenty feet long, known as the "Old Tunnel," has been driven into the hill on the vein. It is said that the vein, at this place, had an average width of two feet and yielded an average grade of 100 lbs. of gold to the ton. Numerous small veins were also exposed in the hill, but all were so irregular that they could not be examined.

The company, now known as the Ontonago & Gum Log Mining Company, is located on Gum Log creek, three hundred and fifty yards west of the main shaft. This mill, which was run, at one time, for several years, is still in a fair state of preservation, and has cost the expenditure of only a small amount of money to keep it in running order. The water-works, which were in operation, was provided with a small dam, which was sufficient to run the

ten-stamp mill, and to furnish all the necessary power, at the main shaft, for hoisting etc.

Mr. Henry G. Hanks, late State Mineralogist of California, visited this property, in 1885; and, in speaking of this mine, he says :¹—

“The mine is fairly well opened, and there is a good mill, ready for operation, when the water is turned into the ditch, which is also nearly ready for working. I saw no reason, why the mill should not be started up, and the quartz crushed with success. The mill has ten stamps, with space and ample power for ten more. A projected tunnel, the entrance of which is near the mill, will cut the vein at a considerable depth, and can be made an outlet, for the mine, for years to come. When all the upper works are exhausted, lower levels could be pumped through the tunnel by water-power. I prospected the quartz, and found some of it rich in gold.

“I think quartz could be gathered on the surface of the ground, over a large area of country, which would pay in the mill. The mine was discovered, about twelve years ago, by Edward D. Rogers. He used to pay forty cents per bushel, for crushing the ore to sand, in stump mortars, with stamp pestles, by setting iron wedges in stems of wood, which, for convenience, were attached to spring poles. He then rocked the sand with quicksilver. The gold obtained, gave him a profit of about \$1.00 per bushel. The stump mortars may still be seen. The tree was cut down, and the stump sawed off square. The concavity was made by burning with live coals, assisted by judicious use of the axe. While this was a rude substitute, for a crushing apparatus, it served a useful purpose, and enabled the miners, in an imperfect manner, to extract the gold, that under other circumstances would have been practically inac-

¹ Fifth Annual Report, State Mineralogist of California, 1885; p. 146.

cessible. There has, at no time, been a mill at this mine. The new mill has not yet turned a wheel.

"On my return to San Francisco, a sample of quartz from Wellborn Hill, weighing three hundred and twenty grams, was crushed and sifted, and at my request, Mr. Melville Atwood carefully washed it in a batea. The prospect, or residue, weighed 0.1263 grams. It contained a little quartz, but was largely gold, beautifully clean and bright, and part of it, in distinct crystals. There were some particles leaf-like, but crystalline. The rock was very easily crushed. The following is the result of an examination and assay of an average specimen from Wellborn Hill, Union county, made since my return: —

Percentage of gold . . . . .	.0153
Ounces in ton of 2,000 pounds	4.47
Value per ton	\$92.40"

THE BROWN SHAFT

One mile southwest of the Wellborn Hill mine, *on lot 19, 9th district*, a shaft, known as the Brown Shaft, has been run down on a ten-inch quartz vein, to the depth of fifty-five feet. The ore, lying near the opening, which had been taken from the shaft, contains a great deal of pyrite; but, having no means at hand, to get down into the shaft, the ore could not be examined, in place. It is reported, that four tons of this ore produced, at the stamp-mill, an average of twenty pennyweights of gold per ton. Near by, are other prospecting shafts and tunnels, made many years ago, all of which are now, more or less caved in.

LOT 20, 9TH DISTRICT

On ~~lot~~ **lot** 20, immediately west of lot 19, a large, granular, gold-bearing quartz boulder, weighing more than a ton, was seen. It was **located** in a depression, near a small ravine; and it had evidently **been** derived, from the breaking down of a quartz vein, near by. **A** limited amount of placer-work, and some prospecting for the **vein**, has been carried on, here; but neither proved to be **successful**.

THE OLD GUM LOG MINE

This mine is located *on lot 52, 9th district*. It was discovered, **many years** ago; and it was more or less extensively worked, immediately after the late war. If current reports, concerning its richness, **can** be relied upon, it must have been, in its earlier days, a **profitable** mine; and it could, even now, probably, be made to pay a **fair** dividend, if judiciously worked.

The **p** principal part of the work, done here, was near the end of a **low ridge**; and it consists of numerous shafts, tunnels and cross-cuts. **R** report is current, that the extreme western point of this ridge, made up of mica-schists and gneisses, decomposed to some depth, **co**ntains a number of auriferous veins, that have been worked, in places, to the depth of seventy feet. All the excavations had **so fallen** in, that the veins were all hidden from view, except one, in an **open** cut, near the top of the hill. This vein, varying in thickness, from four to twelve inches, corresponds, in dip, to the

mica-schist ; and it consists of reddish and light-colored quartz, with cavities, in which free gold may often be seen. Specimens of ore, lying on the surface, which were probably taken from a considerable depth, contained pyrite.

Within a short distance of the mine on Gum Log creek, may be seen the remains of an old stamp-mill, which was formerly used, in crushing the ore. The creek at this point is small, though it has a considerable fall, and furnishes sufficient power, to operate a small stamp-mill. An ore sample, taken by the writer, assayed in the laboratory of the Survey, yielded, as follows : — Ore sample, Old Gum Log Mine, .05 oz. (\$1.00) of gold per ton.

THE HUNT PROPERTY

On the Hunt Property, *lot 55, 9th district*, a gold-bearing quartz vein was discovered, about eighteen years ago ; and some of the ore was taken out, and milled. Since then, a shaft, forty feet deep, and a short tunnel and an open-cut have been made. In the open-cut, occurs a white quartz vein, from eighteen to twenty-four inches thick, dipping with the mica-schist. At this exposure, the vein carries very little gold, and the ore could not be milled with profit ; while only a few feet away, in the forty-foot shaft, now filled with water, the vein is said to have yielded a high grade of ore. From a pile of ore, taken from the shaft, some nice specimens with brownish cavities were secured, showing free gold.



PLACER-MINING AT THE NEWTON GOLD MINE, TOWNS COUNTY, GEORGIA.



THE COOSA CREEK PLACER MINE

This mine is located on Coosa creek, *in the 9th district* of Union county, *on lots 85, 86, 87, 93, 94, 95, 124, 129 and 130*, four miles south of Blairsville. This section of the country is quite mountainous, with numerous peaks, reaching an altitude, of more than four thousand feet above sea-level. The creek, along which placer-mining has been carried on, is a typical mountain stream, making its way through the hills, in narrow gorges, that, frequently, become expanded into fertile valleys, underlaid with auriferous gravel. Within the gorges, the stream forms numerous shoals and cataracts, having an aggregate fall of many feet, in a few hundred yards. The channel, in these narrows, is frequently so filled with large boulders, which have fallen from the adjacent cliffs, from time to time, that the stream is often almost hidden from view as it flows between them; but, where the obstructions are less abundant, or absent, the bed-rock, consisting of mica-schists and gneisses, is worn smooth or cut into numerous pot-holes, by the action of the sand and pebbles, driven along by the rushing water. The creek has ample water, throughout the entire year, to carry on extensive sluicing; and, by extending a system of flumes and ditches, only a short distance back into the gorges, almost any desired head of water can be secured for hydraulic purposes.

The bed-rock, underlying the valley, where gold has been found, in paying quantities, has not, in all cases, on account of its variable hardness, been cut down by erosion to a uniform plane; but it is more or less irregular. This gives rise to many shoals and eddies, when the earth and gravel have been removed, by sluicing. These irregular surfaces seriously interfere with the saving of the gold;



THE COOSA CREEK PLACER MINE

This mine is located on Coosa creek, *in the 9th district* of Union county, *on lots 85, 86, 87, 93, 94, 95, 124, 129 and 130*, four miles south of Blairsville. This section of the country is quite mountainous, with numerous peaks, reaching an altitude, of more than four thousand feet above sea-level. The creek, along which placer-mining has been carried on, is a typical mountain stream, making its way through the hills, in narrow gorges, that, frequently, become expanded into fertile valleys, underlaid with auriferous gravel. Within the gorges, the stream forms numerous shoals and cataracts, having an aggregate fall of many feet, in a few hundred yards. The channel, in these narrows, is frequently so filled with large boulders, which have fallen from the adjacent cliffs, from time to time, that the stream is often almost hidden from view as it flows between them; but, where the obstructions are less abundant, or absent, the bed-rock, consisting of mica-schists and gneisses, is worn smooth or cut into numerous pot-holes, by the action of the sand and pebbles, driven along by the rushing water. The creek has ample water, throughout the entire year, to carry on extensive sluicing; and, by extending a system of flumes and ditches, only a short distance back into the gorges, almost any desired head of water can be secured for hydraulic purposes.

The bed-rock, underlying the valley, where gold has been found, in paying quantities, has not, in all cases, on account of its variable hardness, been cut down by erosion to a uniform plane; but it is more or less irregular. This gives rise to many shoals and eddies, when the earth and gravel have been removed, by sluicing. These irregular surfaces seriously interfere with the saving of the gold;

33

elt;

op-

at

ple.

led

ul-

os-

99,

des

the

ple-

the

ken

and

ter-

rty-

onal

and

mic

the

gas-

nite

zite

net,

CHAPTER VII

HALL COUNTY

By FRANCIS P. KING, ASSISTANT GEOLOGIST

The principal mining operations in this county must be spoken of, merely as prospecting. This fact has been due to the properties falling into unfortunate hands. The occurrence of diamonds in the itacolumite, north of Gainesville, seems to have attracted more local attention, than the auriferous deposits. Nevertheless, when some of the well-known gold-bearing veins are free for legitimate development, this county will average well, in its gold production, when compared with other counties, now more favorably considered. The gold belt of this county extends down from the Habersham county line, west of the Southern Railway, and out beyond the Chattahoochee river. The best developed property is the Currahee. Other properties, though less developed, will awaken interest, when more attention is centered on this county. A description of those properties, which have been more or less prospected, follows.

THE GLADES

"The Glades," a small settlement five miles northwest of Lula, is the center of a large body of land owned by Mr. A. J. Jennings

of Brooklyn, N. Y. A portion of this estate lies in the gold belt; and, some years ago, it was considerably prospected. No development of consequence, however, followed the prospecting; and, at the time of my visit, the results of this old work were not visible.

In the northeastern corner of *lot 94, 12th district*, the so-called "Stephenson vein" was opened. The ore-body consists of a sulphide-quartz vein, one and a half feet thick, striking N. 80° E.

A quartz vein, said to contain a sulphide of silver, was prospected, by several long tunnels, in the northwest corner of *lot 99, 12th district*.

In 1887, a ditch was constructed from Flat creek to The Glades — a distance of several miles — for the purpose of hydraulicking the deposits of the Glades branch. Immediately after the completion of the ditch, a two hundred-foot sweep was made down the branch, and \$10,000 worth of gold is reported to have been taken out. The ditch is now used as a water-supply to the house and stock buildings.

Mr. C. R. Clemmens, manager of the estate, has made an interesting collection of the minerals and ores found on the property. These were exhibited at the recent Cotton States and International Exposition, held in Atlanta. Perhaps the most interesting and important mineral in the collection, on account of its economic importance, was monazite, which is now extensively used in the manufacture of the incandescent mantles of the Welsbach gas-burner, a new form of burner, which produces a beautiful soft, white light, now being largely introduced into city homes. The monazite from this locality occurs as sand, associated with magnetite, garnet, gold, quartz etc., as other components of the sand.

THE ODOM PROPERTY

The Odom Property, about thirteen miles from Gainesville, contains 210 acres in *lot III, 11th district*. In the summer of 1894, when visited by me, it was owned by A. M. Whelchel and Benjamin Parks. At this time, H. Odom and T. C. Evens were working it, under a lease. Previous to 1894, it had not been worked for fifty years; during the original working, however, by Benjamin Parks and a man by the name of Garwin, \$1,000 worth of gold was produced, in four weeks. These original operators found a rich shoot, carried the ore in sacks to a small branch some distance away, and there washed it by hand.

The vein, upon which all have worked, consists of a system of quartz stringers intercalated in mica-schist, forming an ore-body about three feet thick. This ore-body lies on the southeast side of a hill, near the east side of the lot. The sample, taken by me for assay, gave, in the laboratory of the Survey, a value in gold of \$6.00 per ton.

THE PARKS PROPERTY

Lot 56, 11th district, is here noted as the Parks Property. On the lot, near the center, a solid quartz vein, six feet thick, cuts the country-rock at a large angle. The strike of the vein is N. 70° W.; and it dips sharply to the southwest. On the north side, the vein is practically barren of pyrite, and is solid; but the southern half is

porous, and shows the presence of a large amount of oxidized sulphide.

The sample taken from this vein for assay yielded, in our laboratory, only a trace of gold.

THE JOHNSON PROPERTY

This property, *lot 72, 10th district*, is situated about ten miles northwest of Gainesville. It is owned by J. W. Johnson, Jr., who lives close by. A small sulphide-quartz vein, one foot thick, has been located here, and exposed by a few shallow cuts. The vein cuts the country-schist, at a small angle, and strikes N. 57° E.

The sample taken for assay was found to contain only a trace of gold.

The same vein has been traced into Dunnagan's lot, on the east, and Simpson's lot, on the west.

THE POTOSI MINE

The Potosi Mine is situated twelve miles northeast of Gainesville, on *lot 85, 11th district*. Sixty-two years ago, it was operated, for two years, by some Englishmen. The oldest settlers tell of an immensely rich shoot, discovered by these workers; and they add, that the discovery was blocked by an impenetrable horse. In 1894, John Johnson and J. H. Summerall took an "option" on the prop-

erty, and sunk a shaft, close to the old works. They soon abandoned work, on account of their inability to cope with the quicksand. June 10th, 1895, "The Potosi Mining & Milling Company" was incorporated; and Mr. H. T. Fisher was made president and manager. The search for the rich shoot was continued. At my last visit, during the summer of 1895, it had not been discovered, and they were laboring with the quicksand, which had so disarranged the plan of former workers.

The vein, in which they are attempting to re-discover the rich shoot, is about eighteen inches in thickness, with a vertical dip, and striking N. 50° W., cutting the country-schists at a wide angle. It consists of a milky white quartz, with a structure of parallelly arranged interlocking acicular crystals. In the joints of the vein, made by the meeting of these crystals in their horizontal extension, free gold is sometimes, but rarely, found. In the ore-body, there is, however, no trace of sulphides. I have not seen a vein of similar character in the gold-fields of the State.

The gold, occurring on this property, both in the vein and in the little branch, is exceptionally low grade. Mr. Fisher informed me, that it runs fourteen parts silver and twenty-five parts gold.

THE ELROD PROPERTY

The Elrod Property is situated about six miles northwest of Gainesville, on the Dahlonga road. Embraced under this head are the following properties: —

	Lot	District
The Stephens.....	99	10
The Keath.....	100	10
The Newton.....	103	10
The Ivy Mountain.....	104	10

Prior to the war, some rich ore shoots had been found on these lots, and the owners did an extensive amount of work, as is evinced by their numerous pits and dump-piles. A few years ago, a fifteen-stamp mill was erected on the Ivy Mountain lot, and an unsuccessful effort at milling the ore-body was carried on, for a short time.

The occurrence of the ore-body is interesting, and exceptional in Georgia. The schists of the region have a very slight dip and are apparently interbedded with seams of small milky-white quartz, carrying a small percentage of sulphides. This seam varies in thickness, from a few inches to several feet, and is evidently a stringer vein horizontally inclined. The topography of the region is such, that the vein is readily exposed, by shallow pits, and is to be found over a wide area.

The major portion of this immense bed of quartz is of a very low grade ore, although, in the past, some rich pockets may have been found. The mining of the vein, as a body, however, would be impracticable.

THE PASS PROPERTY

This property was opened up prior to the war; and, with the exception of some trifling work, done a few years ago, by Beam

and Calhoun, to introduce their chlorination-process, no work has been carried on, since.

It consists of *lots 132 and 133, 10th district*. On both lots, a vein about sixteen inches in thickness has been exposed, and shafts forty and seventy feet deep, respectively, have been sunk. At each shaft, the ore-body shows the same strike, and is perpendicular and unconformable to the country-rock. Judging from the position of the exposures and the strike of the ore-body, it is one and the same vein.

From the shaft on *lot 133*, the only one I could enter, I took a sample of ore from the east side of the shaft. The assay value, as determined in the laboratory of the Survey, was \$1.00 per ton.

THE LONGSTREET PROPERTY

The Longstreet mineral property lies two and one half miles north of Gainesville, and consists of *lot 130, 9th district*. The mineral interest in this lot is owned jointly by Messrs. Robert Lee Longstreet and Benjamin A. Merck, of Gainesville.

Great excitement was aroused over this property, a few years back, by the discovery of gold in a quartz vein, in the bed of a small branch. Several hundred pounds of quartz slabs, completely encrusted with minute plates of gold, were taken from a small pit, a few feet in diameter. Immediately following this discovery, an offer of \$8,000 was made to the owners by certain parties; but it was not accepted. Inconsequent efforts, for a brief period, followed up this discovery; but, since then, the branch has held possession.

It is presumed by the owners, that this is a chimney formation ; but their development was too slight, to warrant such a conclusion.

South of the creek, and cutting the schist formation at a wide angle, is another vein, which should be developed, in conjunction with the branch vein. The property was not in such condition, as to admit of my taking material for assay.

THE MERCK PROPERTY

On the property of Charles S. Merck, of Gainesville, *lot 129, 9th district*, Messrs. Taft & Ebler, of Chicago, prospected a system of small quartz stringers, which form a zone in the mica-schist, aggregating a width of three feet. This ore-body lies conformable to the enclosing schist, with a strike, N. 55° E., and a dip of 35° to the southeast. Assay of surface material, showing a value of \$6 per ton, they erected a plant, at an expense of \$700.00. This plant consists of a small mill-house with engine, crusher, concentrator and amalgamator. Operations extended over a period of several months, during which time, they had run an incline-tunnel down on the ore-body, to a length of seventy-five feet. Finding, that their operations were being conducted at a continued loss, and the ore decreasing in assay value, they abandoned the property.

THE O'SHIELDS PROPERTY

Near the Merck property, on *lot 127, 9th district*, Mrs. W. H. O'Shields, the owner, has stripped several auriferous veins, for a few feet. On the northeast side of the lot, a vein, one to two feet thick, cuts the schist at a well defined angle, and strikes N. 75° W. The vein contains some sulphides, oxidized at the depth exposed. A sample from this vein was taken for assay; the report, by the Survey Chemist, gives only a trace of gold present. The dirt walling of the vein, when panned, gave a very fair showing of gold. One hundred yards to the northwest, a smaller vein, similar in character, has also been cut.

THE MAMMOTH MINE

The property, known as the Mammoth Mine, lies three miles northeast of Gainesville, close to the Southern Railway. It is said to belong to William Willim. Several years ago, considerable prospecting was carried on, here; but with what results I am not informed. There appears one main shaft, which was closed at the time of my visit. I examined the ore from the dump of this vein, and found it to be similar, in character, to that at the Currahee Mine, a description of which follows, below

THE CURRAHEE MINE

The Currahee Mine is located along the Southern Railway, about six miles northeast of Gainesville. It is owned by Josephus Roberts of Philadelphia. Up to a few months ago, J. S. Hamilton, of Athens, was preparing to operate the ore of this property, by a roasting process; financial difficulties and expiration of lease necessitated his abandoning the property. During his presence here, however, an admirable twenty-stamp mill was erected; also a furnace for roasting the ore.

The ore of this mine comes from two veins, both of which have about the same thickness, strike and dip. One lies on the east side of the railroad; the other, on the west. The ore-body on the west side has been cut into, by tunnels and open cuts, for a length of several hundred yards. In the open cut near the mill, it shows a thickness of five and one-half feet, striking N. 65° E., with a dip 85° to the southeast. The vein on the east side of the railroad has been less prospected. Upon it, in a sharp ravine, due east from the mill, is one cut. This exposure shows a three and one-half foot vein, with practically the same strike and dip, as the western vein.

Specimens from the two ore-bodies are indistinguishable. The veins consist of hard milky-white quartz, containing a large proportion of the sulphides, pyrite and galena. As an auriferous body, it is of low grade. The ore-bodies, however, are both so extensive and easy of access; and the concentration of the sulphides, per ton, would be so large, that it is very probable, that this property can be operated, at a satisfactory margin.

CHAPTER VIII

GWINNETT COUNTY

By FRANCIS P. KING, ASSISTANT GEOLOGIST

The knowledge of the existence of gold in this county has been apparent, for some time; yet, in the past year, more interest has been centered here, owing to the application of the Piedmont property owners to its development. Prior to the late war between the States, work was confined to the two adjoining properties, the Simmons and the Shelly, and to the Harris, where the work was carried on lustily and successfully by the employment of slaves. It is only in the past few years, that outside prospectors have turned their attention to this county, and their efforts seem, thus far, to have been haphazard and spasmodic, rather than well directed and continuous. The auriferous belt, as now known in this county, lies along the line of the Southern Railway, between the towns of Suwanee and Buford, the major portion lying west of the railroad. A description of properties in this county follows.

THE PIEDMONT PROPERTY

The Piedmont Mine is located on *lot 304, 7th district*, and lies about two miles northeast of Buford. It is controlled by a stock

company, known as the Buford Gold Mining Co., and the work is carried on, under the personal supervision of Mr. F. J. Rothpletz, a mining engineer.

This is the only property, now being operated in Gwinnett county.

The plant, although small, is well-equipped for the present development of the property, and consists of —

A mill-house, with all attachments	25x30 ft.
An engine-house, with engine	13x18 ft.
A stable and carriage-house	16x24 ft.
A concentrator roof attached to mill	12x16 ft.
A blacksmith-shop, with blacksmith and carpenter tools,	14x16 ft.
A small dwelling-house.....	16x20 ft.

The old work on this property is on the same vein, that is now being worked, and consists of one main tunnel, cutting the vein, 185 feet (still in splendid condition for examination); one cross tunnel, 100 feet; one culvert 150 feet, and seven shafts. The working shaft is well timbered, lined and partitioned. At the time of the writer's examination of the property, during the summer of 1895, they were clearing out the stopes, and had reached a depth of sixty feet. Their purpose, at this time, according to contract, was to extend the shaft to an eighty-foot level, before they began to mill and concentrate the ore.

The Piedmont vein is plainly what is known among mining men, as a true fissure-vein, cutting the laminated country-rock, at a wide angle. It strikes about due east, the strike of the country-rock being about N. 50° E. The ore-body will average, from eighteen inches to two feet in width, and consists of compact milk-white quartz, containing varying proportions of pyrite, galena and free gold, the latter frequently apparent to the unaided eye. Immediately adjoining the vein proper, or in its "binding," are small quartz

stringers, which will undoubtedly pay to work, with the main ore-body. This ore-body has been traced, already, several hundred yards, by test-pits ; and surface indications may be found along its lead, for some distance.

Assays of the ore, made for the company, from both picked and average samples, have been, thus far, most captivating. Crawford mill-tests have been made, showing a mill-saving of over seventy per cent. of its assay value. The lowest assay made was \$5 per ton, while other assays have reached \$31 per ton. These tests have invariably shown a tendency toward increase in value, with depth.

An assay, made in the laboratory of the Survey, from the sample selected by the writer, did not yield such high results, a value of only \$1.00 per ton being obtained.

THE SHELLY PROPERTY

The Shelly property lies about four miles west of Buford, and consists of *lot 290, 7th district*.

Several veins have been cut on this lot, and long lines of open cuts, now more or less fallen in, may be found along the leads on this property. The ore-bodies were worked, years ago, by slaves ; and the reports of the profits have become so warped, by passing from mouth to ear, that we can only consider them legendary. Nevertheless, the assays of the ore, made by different people, from material taken from various points along these veins, seldom fall below \$6.00 per ton ; and picked ore runs exceedingly high. Ore for assay was taken by me from the largest vein, and the result of the assay, in the Survey laboratory, is as follows: —

Ore sample taken from the large vein on

the Shelly property ----- 1.175 oz. (\$23.50) per ton

The veins strike almost due east and west, and have an average dip of 65° to the south. They are made up of a compact quartz body, containing a large percentage of sulphides, which, in the surface material, has become partially, and often completely, oxidized. The greatest thickness of the vein exposed was four feet; the average width, about two.

There seems to be little doubt, but that this property can be operated most advantageously. A large amount of ore is already in sight, and the character of the veins would warrant the supposition, that the supply is fairly inexhaustible. During slavery times, these ore-bodies were worked with arrastres, a rude apparatus, used in Mexico and certain places in this country, for grinding ore. Since the war, scarcely any work has been done, on any of the veins. For the past year, Captain James Thompson¹ of Buford has been interested in the property; and, through his efforts, we may look to its early development.

THE SIMMONS PROPERTY

The Simmons property, formerly known as "The Percy Gold Mine," is now owned by Mr. Roby Robinson of Atlanta. It joins the Shelly, on the east, and consists of *lot 290, 7th district*.

The Simmons property was operated, during the same period as

¹ Since this report was submitted by Mr. King to the State Geologist, the latter has been informed by Mr. F. J. Rothpletz, that Capt. Thompson has become the owner of this property, and that work would begin soon, on the erection of a 20-stamp mill, with concentrators and a chlorination plant. Oct., 1896.

the Shelly. Unlike the Shelly, surface quartz fragments are not numerous. One vein, nevertheless, has been exposed and operated. The ore is similar to that of the Shelly. The vein has the same strike and dip, as those of the Shelly.

Such work, as has been done here, time has almost obliterated ; yet old piles of ore are still in evidence. From these it is judged, that the value of the ore is unusually high, and that what is said, in regard to the Shelly vein values, may be repeated here, except as to the amount of ore in sight. The ore, taken for assay, in the laboratory of this Survey, was obtained from a large dump near the main pit ; and it may be taken as an average of the same.

Sample of dump ore on the Simmons property -- -- \$16.44 per ton

THE MOORE AND BROGDEN PROPERTY

Lots 309, 310, 318 and 319, 7th district, have been prospected to some extent, in the past year. A few interesting veins have been exposed, by small test-pits. These were panned carefully, with most favorable results. The development, however, of any other vein, at the time of the survey, was too slight, to assist in drawing satisfactory conclusions.

THE WILL BROGDEN PROPERTY

On *lot 258, 7th district*, a little over two miles southwest of Buford, is a large exposure of quartz, which has attracted some attention, on account of its unusual size. The outcropping is about 20 feet in diameter, and large bowlders of the same are strewn over the neighboring surface. As is usual, with such large outcroppings, the quartz is practically barren of gold. Its occurrence, nevertheless, induced prospecting, and several trenches have been dug along probable lines of strike, but without resulting in anything further than the attendant expense.

THE ROBERTS PROPERTY

In the southwest corner of *lot 253, 7th district*, occurs a large outcropping of a quartz vein, rich in iron sulphide, more or less oxidized and disintegrated. The vein, at the exposure, swells out, to a width of ten feet. It has been thoroughly tested by prospectors and pronounced worthless. No attempt seems to have been made toward tapping the vein at other points. Nevertheless its appearance is such, as to warrant such prospecting, as a fair test demands.

The property belongs to Mr. and Mrs. A. R. Roberts, who live close by, about a mile and a half northeast of Suwanee.

The adjoining *lots, 254 and 255*, were prospected by Mr. N. P. Pratt, of Atlanta, during the spring and summer of 1895, for iron.

THE HARRIS PROPERTY

The Harris property lies about one mile northeast from Suwanee, on lot 275, 7th district. This property is interesting, from the fact of the occurrence, here, of two veins cutting the schist, at an angle of about 25° , and dipping toward each other. The ore is of the same character, as at the Shelly and the Simmons properties, that is, rich in limonite and partly altered pyrite. The presence of siderite (iron carbonate) is also noted, here.

The veins lie about one hundred yards apart, and strike N. 75° E., dipping, the one at the north, about 65° to the southeast, and the southern vein, about 55° to the northwest. These, as has been stated, are not conformable to the schist; but they cut it, at a well defined angle. Their true fissure character is likewise well shown, by the crumbling of the schist wall. Very little has been done, in the way of development. On the northern vein, a single shaft about twenty-five feet deep, occurs. A cut, with numerous pits, is to be found on the southern vein. The southern vein was worked, many years ago, with slave labor, using an arrastre, for milling the ore. The result of this labor is not known; it can be judged only by the amount of work, which has been done, here.

Ore for assay was taken from the southern vein; but the Survey Chemist reports only a trace of gold present.

This property is controlled by J. F. Baxter, Esq. of Suwanee, Ga.

CHAPTER IX

FORSYTH COUNTY

By FRANCIS P. KING, ASSISTANT GEOLOGIST

Two gold-belts pass through Forsyth county; the DAHLONEGA GOLD-BELT, which passes through the northwest corner, and the HALL COUNTY GOLD-BELT, running through the entire county, on the east side. Besides these two belts, we find an isolated area in the center of the county, the Sawnee Mountain gold area. Authentic records, of gold-mining in this county, date back to some time, prior to the opening up of the California gold-fields. More or less stream-washing and vein-prospecting has been going on, ever since. Although there are no records, of a specially startling find, in Forsyth, yet a small proportion of the population have yearly eked out, from this industry the larger part of their living. The work of such laborers has been confined largely to stream-washing, although a few veins have been partially worked to water-level.

No property in this county has been more than prospected, and this has generally been done, by the owners, who have not sufficient means to supply a proper plant for the development of worthy discoveries. Several such properties may be especially mentioned; as, for instance, the Strickland, the crude working of which enriched the old members of the family; also the Charles and the Little properties, both of which are well opened up. The latter property is in the eastern gold-belt; the two former, in the western.

THE CHARLES PROPERTY

This property lies near the junction of Dawson, Forsyth and Cherokee counties. It belongs to Dr. Frederick Charles. *Lot 77, 3rd district, 1st section*, is the land, upon which all the prospecting has thus far been carried on. This development shows two stringer leads, each averaging several feet in width, striking N. 60° E., and dipping 70° to the southeast. These veins are separated from each other, by a space of about twenty feet. They differ from each other, only in the extent of oxidation of the iron sulphide. The vein to the north is rich in iron sulphide. This is comparatively fresh, while the sulphides of the vein to the south have undergone considerable decomposition. Pits, varying in depth, have been dug at irregular intervals along the leads of both these veins, for several hundred yards. Although, at the time of the Survey examination, these pits were useless for observation, yet it is said that the veins throughout the length tested, maintained the average width already given.

Above the ten-stamp mill, located on this property, a large cut enabled a very good examination of both these veins. This property, lying, as it does, in the neighborhood of the Franklin mine,¹ and the ore-bodies resembling each other so closely, much interest will be attached to its development. Attempts to free-mill the ore have necessarily proved futile, the gold being bound up in the sulphide. Enterprise, tending toward a more definite knowledge of the economic value of these ore-bodies, has probably been hampered by the management.

¹ Now the Creighton Mine.

Dr. Becker,¹ of the United States Geological Survey, who examined this property reports the occurrence, here, of numerous slickensides, with their surfaces stained black with manganese ; and he concludes, from observations of similar occurrences on various properties, that these are not due to faulting, but to the changes of the rock in volume attending decomposition. These observations are of interest, in as far as, if the reverse were true, we should expect to find, in the working of these ore-bodies, troublesome displacements.

THE STRICKLAND PROPERTY

The Strickland mines, occupying lots 67 and 68, 3rd district, 3rd section, must be judged by past glory, on account of the present condition of the old works. It is well known, that the Strickland family were enriched, by the gold, taken from this property. Nevertheless, no mining work, of any duration, has been conducted here, for years. The ore, worked by the Stricklands, came from stringer leads, and only free-milling ore was handled. It is most probable, that the occurrence of sulphides caused the abandonment of the mines. The character of the ore-bodies is, very likely, similar to that of the Cherokee properties, near by.

¹ Reconnaissance of the Gold Fields of the Southern Appalachians, by George F. Becker — Sixteenth Annual Report, U. S. Geol. Sur., Part II, Mineral Resources.

THE PARKS AND FOWLER PROPERTY

The Parks and Fowler property lies about nine miles west of Cumming, and consists of *lots 933, 934, 935, 936 and 937, in the 3rd district, 1st section, Forsyth county, and lots 973 and 974, 3rd district, 2nd section, Cherokee county.*

On May 7th, 1867, a New York company purchased this property, at a price of \$1,000,000. All these lots, with the exception of the house-lot, 937, were prospected. For years, no work of a mining nature has been done upon them; and the old tunnels and pits were so completely filled in, at the time of the writer's visit, that it was impossible to determine the character of the veins opened.

The abandonment of the property by the New York people tends to discredit its value as a mineral property. Nevertheless, local reports and traditions of the revenue, obtained by the early owners, working it with slave labor, are very alluring.

Dr. John Hockenhull, of Cumming, Ga., is agent, and owner of one-third interest in this property.

THE SAWNEE MOUNTAIN PROPERTY

SAWNEE MOUNTAIN, lying in the heart of Forsyth county, towers, in solitary grandeur, 900 feet above the surrounding country, otherwise practically unbroken. Its central summit rises 1,967 feet above the sea-level; and spurs, from this, trend from northeast to southwest, making a total length of about six miles. Generation follow-

ing generation have panned, and in other ways prospected, this mass, for gold. The metal, however, has been found, only upon the southeastern slope.

The objective point, for the past few years, has been on the southeastern side of Sawnee mountain, proper. Here, several cuts and tunnels have been run, in an endeavor to discover the source of the stream-gold. These efforts have, thus far, been futile.

During the year 1895, Messrs. Hampton & Herman, of Atlanta, obtained control of lots 820, 836, 837, 891, 892, 893, 909, 910, 911, 912, 913, 914, 960, 963 and 983, 3rd district, 1st section; and they have been working the hill-deposits, with very satisfactory results. Their operations, up to the time of examination by me, were in the nature of prospecting. With fifteen men (three working at night)

and a tiny stream of water for sluice-box washing, they were able to overcome twelve feet of "topping," and work five or six feet of gravel per day, averaging twenty-five dwts. of gold. When we consider the difficulties, under which they labored, and the small area, which could be worked, in this way, during a day — all being done by hired manual labor — this result is especially conducive to expenditure, looking toward an easier method of removing the deep "topping," and washing the gravel.

While Messrs. Hampton & Herman were perfecting an organization, to operate this property, and were preparing to arrange a reservoir system for hydraulicking, the deed-titles, under which they held this property, were questioned; and they were forced to suspend further work, pending court decision. The results of their labor, however, tend to show, as conclusively, as is possible, on mineral properties of this character, that Sawnee mountain can be worked with profit.

Geologically considered, the mountain is made up of schists and gneisses, striking northeast, and dipping sharply to the southeast.

Interbedded with these, are thick beds of quartzite, boulders of which overlie the surface, in such abundance, that the mountain is locally considered to be formed entirely of the same. This latter idea, however, may be shown to be erroneous, by even a casual examination of the prospectors' cuts. One of these, a cut of two hundred feet or more in length, shows a complete walling of schists, with the exception of several quartzite beds, one of which attains the width of twenty feet. Furthermore, a consideration of the laws of natural erosion, on different rocks here displayed, will satisfactorily explain the presence of the quartzite boulders.

THE COLLINS PROPERTY

The Collins property consists of *lot 450, 1st district, 1st section*, and belongs to Mr. Collins, a merchant in Sheltonville, Ga.

Two veins were located on this property, about twenty-four years ago, by Jack Rogers. These ore-bodies vary in thickness, from one to three feet. On one, three shafts, varying from ten to seventy feet, have been sunk ; on the other, only a small pit. The refractory nature of the ore caused its abandonment by Rogers. Others have worked here, and have been balked, for the same reason.

When a plant, for working ores of a similar character, is established in this vicinity, this property should be taken into account.

THE AD. CAMPBELL PROPERTY

Lot 427, 1st district, 1st section, is known as "The Ad. Campbell Mine," from the name of its original prospector. Vein-mining received first attention, in this part of the country, on this property. Campbell, early in the forties, with the assistance of slaves, sunk a shaft one hundred feet deep, and ran out tunnels, in both directions, on a vein. The ore, brought to the surface, was put through an ingenious stamp-mill, constructed on the spot. No well directed effort has been made to operate this property, since, although old settlers affirm, that Campbell's operations were conducted with success. The old works are necessarily in too ruined a condition, to gain any direct information, as to the nature and character of the ore-body worked ; neither does the surface reveal anything.

THE SETTLES PROPERTY

Lot 934, 2nd district, 1st section, is known as the Settles Property. The same Rogers, who worked on the Collins property, also operated here. Several shafts, on a large sulphide vein, marked the extent of his operations. Finding the ore would not free-mill, he quit. This property, as in the case of those already mentioned, in this district, should receive the attention of any one, proposing to operate such ores, in this vicinity.

THE LITTLE PROPERTY

The property referred to, under this head, consists of *lot 420, 1st district, 1st section*. It is owned by two brothers, Dr. E. D. Little and Mr. G. W. Little, of Sheltonville, Ga.

Dr. Little has had this lot thoroughly prospected; and, at this time, it is in better shape for examination, by interested parties, than any other property, in this section of the county. This prospecting shows the lot to be cut by five veins, all of which are conformable to the mica-schists, which make up the country-rock, except one which cuts the same at a large angle. One of the four conformable ore-bodies, the one furthest to the east, has shown free-milling ore to the depth of the shafts, two of which have been sunk, in close proximity to each other, thirty-seven feet. The vein consists of a decomposed sulphide-quartz, sixteen inches in thickness. On either side of the quartz, several inches of the schist "binding" is of such richness, as to necessitate its inclusion as part of the ore-body.

Three tons of ore, taken from these shafts, were milled by F. L. Rempess, a western prospector, on an ingeniously arranged single wooden stamp-mill, located under Dr. Little's grist-mill, and run by the mill-wheel. From these three tons, he obtained, on milling, fifty-six dwts. of gold, from the amalgamation plates. The ore, milled, consisted of the better quartz ore of the vein and all the schist "binding." This test of the ore-body, nevertheless, was of such a thorough character, that the result was satisfactory and highly flattering.

The other conformable vein, being found to contain entirely refractory ore, received little attention. The vein, which cuts the

schists at a wide angle, is several feet in width; but, where exposed, it has not been found sufficiently gold-bearing, to induce much development.

Besides these veins, this property contains the gold deposits of a small branch, running through the north side. Six acres have been worked; and, to-day, native lessees average a dollar a day, per hand, in working its deposits. Frequently, the favorite localities are re-worked.

CHAPTER X

DAWSON COUNTY

BY FRANCIS P. KING, ASSISTANT GEOLOGIST

The Dahlonga Gold Belt passes through Dawson; its western limit is a little over one mile east of Dawsonville, the county-seat. The extent of its auriferous deposits forms a belt, about two miles wide.

During the operation of the Kin Mori mines, the mining interests were most lively; but, in 1888, when the Kin Mori closed, the development of all the gold properties ceased throughout the county. Interesting and important deposits, nevertheless, have been discovered along the belt in Dawson; and awakening along the line will eventually take place. A description of those properties, on which some development may be seen, follows.

THE MORSE PROPERTY

On the west bank of the Etowah river, where the river forms the boundary line between Lumpkin and Dawson counties, Messrs. Urquhart and Elberts did some hydraulicking, the results of which, though unprofitable to the operators, may be interesting to such

parties, as are looking into the development of similar property. By means of test-pits, these gentlemen traced back the old river-bed, and where the gravel was most promising, with one hydraulic giant — water pressure being obtained from a reservoir, filled by a steam-pump at the river — they stripped several acres of surface, in a few weeks.

The gold, panned in the test-pits and saved from the sluice-boxes, was extremely fine. With their best efforts, they found, they were obtaining only a small amount of the test-pit promises; hence they ceased further operations. This work was conducted, during the spring months of 1895.

THE PALMOUR PROPERTY

That part of the Palmour property, about to be described, lies about seven miles, by road, to the northeast of Dawsonville, and consists of lot 361, north half of the 13th, district, 1st section.

For some years, the presence of gold here has been known; and members of the Palmour family have worked on this lot, spasmodically, since it came into their possession. There are few places in Dawson county, that have attracted more attention, locally. The geological formation, shown by stream-cutting, shafts and excavations, consists of schists, striking N. 35° E., and dipping sharply to the southeast. Proctor's creek, which runs through this property, has been successfully washed for gold. The most interesting occurrence, however, and that, which has attracted wide-spread attention, are the quartz stringers, cut at several points along the strike, but only worked at one point. The present appearance of

the excavation, in which the main portion of the energy, directed toward the development of this property, has been concentrated, shows a cut, about two hundred feet long and forty feet wide. In the cut, and well separated from each other, are a series of quartz stringers, averaging from one to six inches in width. On the right side of the cut, one of these stringers has been discovered to be exceedingly rich in gold. This lies close to the right-hand wall, and has varied from a thin ribbon to a vein, one foot in width. It is this vein, which has furnished the major portion of the gold, found by all workers here; and it is this vein, for which the excavation was made.

The vein is quite typical in appearance, and may be readily distinguished from the others, as far as it has been operated. It is made up of a dark, finely granular quartz, arranged in thin parallel bands, of about one-quarter inch, in thickness. This laminated structure of the vein material causes it, when picked out by the miners, to break into rectangular pieces; and, on this account, it is referred to, as "The Palmour Brickbat Vein." Portions of the vein run extremely high in free gold, the gold occurring, not only in the quartz matrix, as I found, by powdering and panning a considerable quantity, but especially along the lines of lamination. In the work conducted under the Survey management, a large number of pieces were split open, and almost invariably flaky particles of gold were apparent to the naked eye. Several pieces have been found incrustated with such flakes. The rotten schist walling was also panned freely; and, from each small panful of earth, the color obtained was surprising.

This vein certainly should be investigated further. The topography is such, however, that artificial drainage will be required to sink further on the vein. Up to a short time ago, the Palmour boys

worked the vein, when they wished ready money. Lately, they have worked the vein to water-level, and hence further operations are blocked, on account of their crude means of operating; their revenue from this source has, therefore, ceased, for the present.

Mr. W. W. Habersham, of Gainesville, Ga., who held an option on this property, at the time of the Survey inspection, had some beautiful specimens from this vein, showing free gold. Also, there is in the possession of the family, a block from this vein, about the size of a man's hand, which being split open, shows the inner sides of the two halves of the specimen perfectly incrustated with minute scales of gold.

THE SHELTON PROPERTY

That part of *J. F. Shelton's Property*, to which the attention of the Survey was particularly called, lies on *lot 241*, north half of the *13th district, 1st section*, about four and a half miles northeast of Dawsonville.

Southwest of his house, on the northeast side of a long ridge, in the small ravine of a spring branch, Mr. Shelton has partially opened up an auriferous vein, previously exposed by the channeling of the branch. This vein consists of a finely granular, laminated quartz, containing a very large percentage of unoxidized pyrite. It is five feet in width, and the gold-bearing pyrite is regularly disseminated throughout the quartz matrix. Because of its accessibility, assay material was taken at this point. The Survey chemist reports on this sample as follows:—

"Shelton Cut, on Sulphide Vein \$1.00 per ton"

Since this is not a free-milling ore, and consequently a special plant will be necessary to operate it, the vein should be carefully tested, at various points, to insure a safe investment. Such a procedure will be practically easy, on account of the ready surface following of the vein, although attended with some expense. This should be undertaken, by all means, in order to give this ore-body a fair test. Sulphide veins, having the inviting characteristics of this, are of too infrequent occurrence in the Georgia gold-fields, to be overlooked.

Below the branch, from which the assay sample was taken, a larger branch cuts this vein. At this exposure, the vein is a little wider, and the pyrite reaches out, some distance into the enclosing schist. From here on, the vein may be traced to the Church lot opening, and beyond; also, to the northeast, from Mr. Shelton's last cut. It will probably average four feet in thickness, and descend to an indefinite depth. Concentration of the ore will give, at least, one ton of crude concentrates to twenty-five tons of ore. The strike of the vein is N. 55° E., dipping about 65° to the southeast.

THE CHURCH LOT

This lot is situated about four miles northeast of Dawsonville, in the north half of the 13th district, 1st section. An outcropping of a pyritiferous quartz vein has been cut, for a few feet, near the spring, back of the church. This is apparently a continuation of the Shelton vein, as it may be traced, from property to property, fairly well, through the intervening lots and beyond, either way, for some dis-

tance. Furthermore, specimens of ore from this lot are indistinguishable from those, taken at the cut on the Shelton property. Careful examination of this vein and its environments reveals no features, differing from those on *lot 241*. The vein is fully five feet in width, and dips about 65° to the southeast, conforming likewise, in strike, to the country-rock.

THE ELLSWORTH PROPERTY

The so-called Ellsworth mine is situated two miles east of Dawsonville, occupying *lot 54, 4th district, 1st section*. *Lot 54* is one of the "fraction lots" of this county.

This property was purchased and operated, for a brief period, a few years ago, by "The Ellsworth Mining Company," an organization composed of persons from Ellsworth, Maine. Since the cessation of its operation by them, Dr. A. J. Robinson, of Dawsonville, has acted as their agent.

Some time prior to the ownership of this property by the Ellsworth people, a concentrated belt of quartz stringers had been cut by native miners. Finding this combination of quartz and dirt to pan well, they immediately set to work, with pick and shovel, using a "long-tom," for washing the ore and concentrating the free gold. For the depth, to which they worked this belt, together with the character of the material, their crude working tools are said to have answered their purpose admirably, in that the work paid them well.

When the Ellsworth Company arrived on the field, their first undertaking was the construction of a five-stamp mill, driven by an

over-shot water-wheel. Immediately after the completion of the mill, an inclined shaft was run down on the belt, and the milling of ore was begun. Unfortunately, the ore soon ceased to pay, and the Ellsworth people retired.

The material worked consisted of an ore-belt, about two feet in width, containing a number of thin quartz stringers. Such a close aggregate of these narrow veins of quartz is so frequently found to be productive in the Georgia gold-field, that they are sought after most eagerly, by prospectors. The native miners made a superficial working of this, pay, even with their rude equipments; and assays made through the Ellsworth Company were sufficiently tempting, for the expense of mill-construction. It is quite possible, therefore, although verification, at the time of the survey, was out of the question, on account of water filling the shaft, that the Ellsworth people were blocked, by attempting to mill the unoxidized sulphides, depending alone, for their returns, on the gold, caught on the copper plates.

This belt of stringers, at the point worked, slopes under a small hill, and dips to the southeast, at an angle of about 25° . It conforms with the strike, N. 35° E., of the mica-schists, which make up the country-rock.

THE KIN MORI MINES

In 1881, Charles W. Short, of Cincinnati, Ohio, and associates purchased between 700 and 800 acres of land, about four miles south of Dawsonville, and organized the Kin Mori Gold Mining Company. The officers of this company were Charles W. Short,

President and Treasurer, Charles L. Mitchell, Secretary, and Messrs. Anderson & Hobbs, of Cincinnati, Engineers. The Kin Mori property, besides some adjacent land, included *lots 861, 862, 908, 909, 910, 911, 926, 927, 928, 929, 976, 977, 978 and 979*. These are all forty acre lots, and lie in the *4th district, 1st section*.

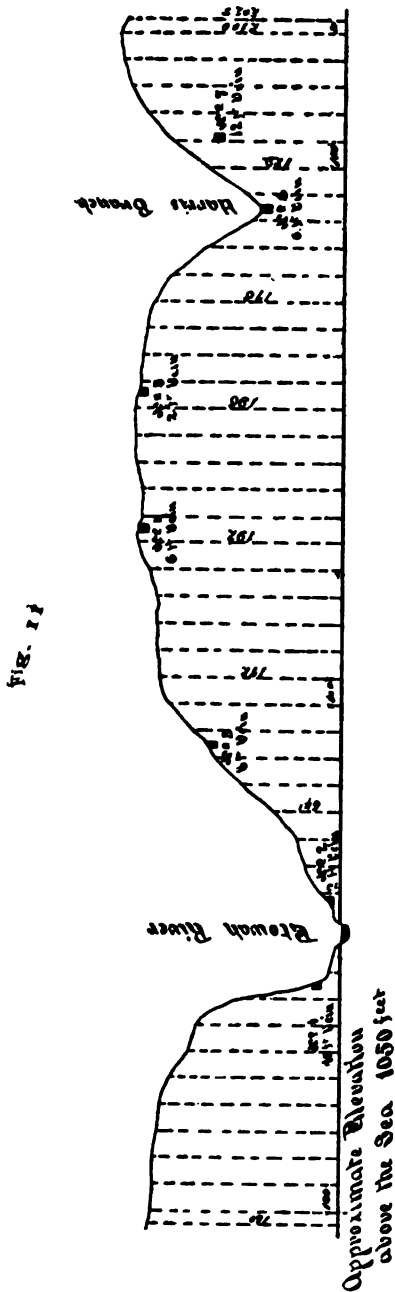
The first work undertaken, looking towards the operation of this mineral property, was the construction of a ditch, for conveying water from Nimble Will creek, in Lumpkin county, to the mine. This ditch, known as the "Nimble Will Ditch," was constructed, and water reached the property, in the early part of 1883. The ditch was thirty-three miles long; and, when completed, it had cost \$40,000. It was designed for a capacity of 1,000 miner's inches (Georgia standard) of water, equal to a volume of twenty-five cubic feet per second. On an average, during the year, the creek furnished about 600 miner's inches.

Having obtained water, hydraulic mining was started immediately. The first objective point was Bean branch. This was worked fifty feet on either side, by means of a No. 15 hydraulic giant, with a water-pressure of 175 feet. From Bean branch, they transferred their operations to the placer on the Etowah river bottoms, just above Hugh's Shoals, from which, tradition says, Indians formerly took considerable quantities of gold. This was the most difficult task to which they set themselves, both fall and dumping ground being absent. To surmount the natural difficulties, they resorted to a hydraulic gravel-elevator. This was operated under a water-head of 300 feet; and it carried, to a height of forty feet, all the water discharged from a No. 8 hydraulic giant, under equal pressure, together with all the clay, sand and gravel moved. The Hugh's Shoal placer was mined, in the latter part of 1883, continuously, for about one year.

During the winter of 1884 and 1885, a thirty-stamp mill, driven by a turbine wheel, was erected on Harris branch. Following the erection of this mill, hydraulic ore mining was instituted, and the property was thus operated, up to the cessation of work, by this company. By means of hydraulic giants, they cut down, as far as possible, the so-called Quarles belt, which consists of innumerable small quartz stringers and lenses in schists. The water from the giants carried the displaced material, through a long line of sluice-boxes, to the mill, situated some distance below the workings. In the mill, the coarse and harder portions were retained in a bin, and were fed to the batteries by hand, the mud and silt being carried through into Harris branch. In this way, a large percentage of the gold obtained was taken from the riffle sluice-boxes. The Quarles belt was thus mined, until the early part of 1887. During the period of operation on this section, some 300,000 cubic yards of earth was removed. The estimated expense of cutting down the ore-body was a fraction of one cent per cubic yard, and of milling the ore, about 50 cents per ton.

Operations of a proportionate nature were continued, until early in the year 1888, when they were postponed indefinitely. In 1883, Mr. D. Lee Wardroper was appointed superintendent, and remained in that position, until the mine closed.

The work of the Ohio people points to but one conclusion, viz., that the veins and saprolite of this body of land, worked by them, is not profitable, as free-milling material. Whether or not the concentrates of the ore contain much gold is not known, since no attempts were made to save them. It is very probable, however, that a large percentage of the gold was carried away in the tailings. Workers of similar material have found such to be the case. A mill will, in the case of some saprolites, save only about one-fourth of



Profile of the "Big Sulphuret" Vein, Kin Mori Mines, Dawson County, Georgia.

its assay value. It has been found, that much of the gold is so rusty, that the friction in the batteries is not sufficient to remove the rust, and the amalgamation plates cannot catch such gold. This rust must be removed by friction in amalgamation pans, or by some chemical means.

There is one vein on the property, which, notwithstanding the misfortunes of the Kin Mori Company, will preserve this area from complete condemnation. This is known as "The Big Sulphuret Vein." It has been prospected by Messrs. Hall Brothers, Mining Engineers of Atlanta, from a point, a short distance northwest of the stamp-mill, to the banks of the Etowah river, a total distance of over twelve hundred yards. Surface shafts have been made, at various points along the vein, and one tunnel, not far from the mill, has been run into the vein. The same gentlemen have also made a survey of the vein, the results of which have been kindly loaned

to the water, and appear in figure 11. The profile of the vein shows the elevations and the locations of the tunnel and pits, and the width of the vein, at the various cuts. The average thickness of this vein is about six feet. It strikes N. 60° E., and dips sharply to the southeast. All the cuts show a compact quartz vein, containing more or less pyrite. In the cut at Harris branch, the pyrite is extensive and unoxidized. At tunnel "No. 7," the character of the ore body is somewhat changed; the previous solid body here spreads out into stringers, with intervening schists, but still strongly sulphide in character. Panning from the ore-body, at this tunnel, failed to give a trace of gold; yet the sample taken by me, from the vein, at this point, yielded high assay results. The sample, assayed, represents an average ore, from the full thickness of the vein; and the marked difference, between this and the Crandall assay, must be accounted for, by the presence of minute particles of free gold. Mr. W. R. Crandall, M. E., of Dahlonega, Ga., assayed the Hall samples from these cuts, with the following results:—

Cut 1-----	\$ 4.13 per ton
" 2-----	1.07 " "
" 3-----	1.03 " "
" 6-----	11.57 " "
" 7-----	1.24 " "

THE SURVEY'S ASSAY

Cut 7-----	\$23.40 per ton
------------	-----------------

Cut 1, being across the river, and my attention not having been called to it, was overlooked. Mr. B. M. Hall, however, informs me, that the vein, at this cut, is fully ten feet in thickness, and will concentrate one ton of crude sulphides to twenty-five tons of ore.

The ore of this vein, although low grade, will probably pay a

working margin. A reduction plant will be required. The expense of constructing a plant will be considerably decreased, on account of the presence, here, of a large stamp-mill, in good condition. This is said to roast and chlorinate raw concentrates for \$3.50 per ton. If this ore will run \$4.00, or even some less, in the ton, and will concentrate one to twenty-five, a calculation of the cost of mining, milling, roasting and chlorinating will show a fair profit to the operator.

THE M'GUIRE PROPERTY

The McGuire property adjoins the Kin Mori. It consists of *lots 912 and 925, 4th district, 1st section*, and lies on the east side of the Kin Mori mill lot. This property is owned by Mr. J. F. Castleberry, a Dawsonville merchant, who is also local agent for the Kin Mori.

The McGuire property gained considerable fame, from a rich strike made there, several years ago. About fifteen thousand dwts. of gold were taken, in a short time, from a small vein near the center of the lot. The vein, worked, is a thin quartz stringer, striking N. 50° E., and dipping about 60° to the southeast. The ore was taken from a short surface cut, and was free-milling. As it ceased to pay, operations ceased, although the present condition of the excavation shows that only a few tons of ore were taken out.

About seventy-five yards to the east of the McGuire vein, on the western side of the opposite ridge, is another prospect. This is called the Whippoorwill vein. It consists of an aggregation of quartz stringers, forming a vein five feet thick. This was panned

at various points, and, invariably, the concentrates showed "a good color." The strike and dip of the vein is similar to that of the McGuire vein.

This property should receive attention. Indeed, when the veins of the Kin Mori are worked, which probably will be the case, in the near future, this property can be operated very cheaply, owing to its close proximity to the Kin Mori mill.

THE LOOPER PROPERTY

The Looper Property consists of mineral *lots 1,000, 1,041 and 1,068, 4th district, 1st section*. The little work, that has been done on this property, has been confined almost entirely to *lot 1,041*. This work consists of a regular series of surface cuts, only a few feet in depth, for about two hundred yards, along the lead of a small quartz vein. This vein, as shown by the best exposures, consists of a compact, stained quartz stringer, about twelve inches wide, with small quartz stringers on either side, widening out the whole ore-body to a width of two feet. Panning from the ore-body, at the various pits, where the vein was accessible, gave very favorable results. Not sufficient prospecting has been done, however, to warrant the Survey in taking assay material.

Results from this ore-body, obtained by Beam & Calhoun, of Gainesville, Georgia, using their own chlorination process, gave from \$12 to \$20 per ton in gold; selected material ran as high as \$60.

This property belongs to William H. Looper, of Barreelsville, Dawson County, Georgia.

CHAPTER XI

MILTON COUNTY

By FRANCIS P. KING, ASSISTANT GEOLOGIST

A gold belt passes through this county, as is attested by the condition of the stream gravel deposits, and the reports, concerning the results of their washing; and some quartz veins have been tested by shallow pits, in the vicinity of Warsaw. One of these was especially noted, because of the presence of two deep shafts, said to have been sunk, some twenty years ago, which exposed the vein excellently. This is on the Brown place, one-fourth of a mile north of Warsaw. The vein is about three feet thick, with a perpendicular descent, and cuts the schist, at a well defined angle. Its ore contains some sulphides, but not in sufficient quantities, to warrant the expense of reducing.

Quite a number of similar veins, but only shallowly exposed, are to be seen about Warsaw; but not one, to which any importance is attached. In fact, no auriferous deposit of any character has been discovered, in Milton County, of sufficient economic value to excite interest, since the washing of the gravel deposits of the streams.

CHAPTER XII

FULTON COUNTY

By FRANCIS P. KING, ASSISTANT GEOLOGIST

Gold is reported to occur, in some of the streams of Fulton county; and the old mineral map of Georgia, published by the Agricultural Department, shows a gold-belt passing through Atlanta. Nevertheless, I have not been able to obtain any information, concerning the working of any gold deposits, except at one locality, which will be described later. It is very probable, that some of the streams, in the belt mapped, have been worked to a certain extent; and the presence of gold, in some of Fulton's streams, is certain; but the present importance of this belt is very slight, economically.

THE LITTLE & GOODWIN PROPERTY

This property lies about ten miles north of Atlanta, on *lot 38, 17th district*. Two quartz veins have been exposed, each vertically inclined, and striking east and west. Both lie within a short distance of each other. The large vein is three feet thick, where exposed by a surface cut, and is practically barren. The smaller is

not more than six inches thick, and has been sunk down upon, sixty feet, but with difficulty, on account of the quick-sand. The ore is said to be free-milling, and of sufficient value, to operate, if its quick-sand walling can be successfully controlled. From the character of the surface ore, I see no reason to question this assertion, as to its value. The former owner claims to have averaged \$1 per day, for several months, from gold extracted from the surface ore, using a hand mortar.

The present owners of this property are Dr. E. D. Little, of Sheltonville, Ga., and Mr. Sterling Goodwin, of Cross Keys, Ga.

CHAPTER XIII

CHEROKEE COUNTY

By S. W. McCallie, Assistant Geologist

There is likely no county in the State, where legitimate gold mining has been carried on, so successfully, as in Cherokee. The early mining was confined, almost entirely, to placer-workings, which were both numerous and profitable. When these deposits became less remunerative, or partially exhausted, attention was directed to the gold-bearing saprolites and auriferous ore-bodies. This class of mining, in places, was also remarkably successful. Instances are given, on good authority, where several hundred pennyweights of gold were taken from a decomposed vein, by a single miner, in a few hours. These veins were, in many cases, worked to the water-level, where the gold occurs in unaltered pyrite ; and there they were abandoned, on account of the owners of the mines not being able to erect suitable plants, for working refractory ores, or, because they were unwilling, to dispose of their property, at rates, that would justify others in working them. Such, in brief, has been the history of a number of prospects, that might, to-day, be paying satisfactory dividends, had they been judiciously worked, and economically managed. The Franklin, or Creighton, mine is a practical demonstration, of what may be accomplished, at several other places in the county, should the necessary amount of

money and experience be brought to bear, in developing its numerous gold prospects.

A great deal of prospecting has been done, in this county, for gold; but it has generally been of such a superficial character, as to give no adequate idea of the worth of the vein, prospected. Open cuts, shallow pits and shafts, made frequently by farmers and others, inexperienced in mining, are found on almost every lot, along the gold-bearing belt. Stamp-mills and other mining machinery, costing originally thousands of dollars, erected on property, before really anything was known, as to the character of the ore-bodies, are now seen, in advanced stages of dilapidation. Such prospecting as this, directed by persons, having little or no knowledge of mining, has usually given very unsatisfactory results, and caused gold property, generally, to be looked upon, however unjustly, as undesirable investment.

THE CREIGHTON MINE¹

This mine, known, for many years, as one of the most successfully operated gold mines in the South, is located on the Etowah river, six miles east of Ball Ground, the nearest railroad station, and about fifteen miles northeast of Canton, the county-seat. Tradition has it, that the occurrence of the yellow metal, in this vicinity, was known to the Indians, and was worked by them, prior to the settlement of the county, by the whites.

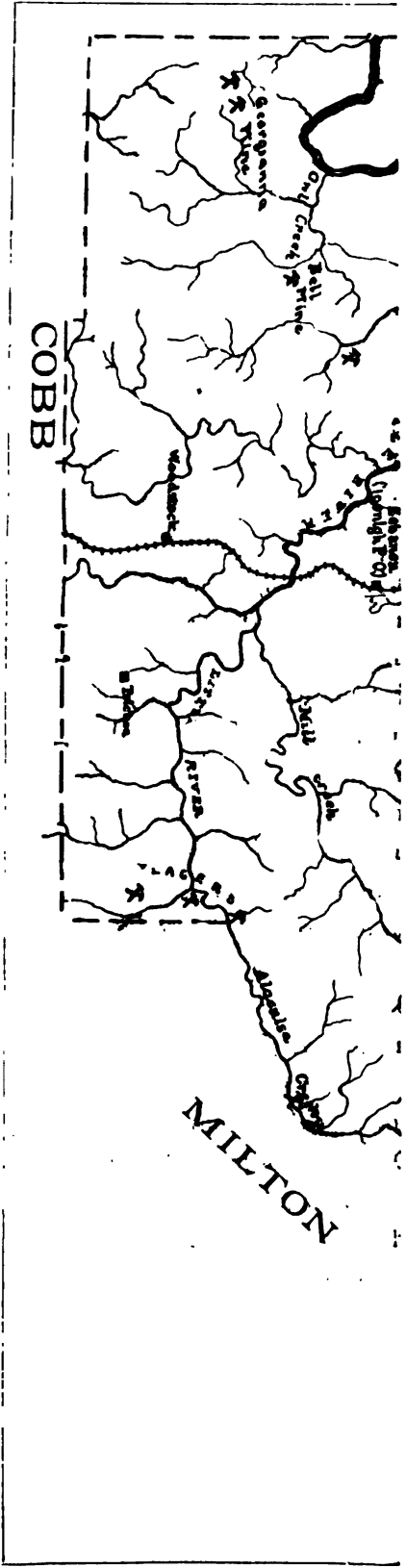
About the year 1840, a short time after the property, on which

¹Until recently, this was well known as the Franklin Mine.

the mine is located, had fallen, by lot, into the possession of the Franklin family, the mine began to be worked quite extensively, and produced, annually, for a number of years, under the management of Mrs. Franklin, a handsome dividend. The early workings, which were executed mainly by slave labor, were confined chiefly to surface-mining. The residual earth, in the vicinity of the ore-bodies, and also the veins, themselves, to the depth of twenty or thirty feet, to which depth the sulphides had decomposed, were found to be remarkably rich in free gold. Many of the old excavations, now partially filled with earth, are to be seen along the outcroppings of the vein. One of these, conspicuous for its large size, located near the river, and within a short distance of the present working-shafts, is said to have yielded, alone, more than fifty thousand pennyweights of gold.

The system of mining, adopted, during the early workings, consisted principally of sluice-washing and the use of rockers. A small stamp-mill, located on the site of the present mill, was also operated, at the same time, in working the vein material. By these means, the greater part of the gold, in the residual earth and the decomposed quartz veins, was saved; but no attempt was made, to secure the gold from the sulphides, which were usually thrown aside, on the dump, as worthless. For twenty years or more, during the lifetime of the Widow Franklin, the decomposed, auriferous material was worked, with marked success. After her death, the mine fell into the hands of her son, who continued mining operations, with little success, until the breaking out of the late war.

Immediately after the war, Watson, Hoskins and Moore successfully organized companies, and each operated the mine, for two or more years, with indifferent results. The great difficulty, encoun-

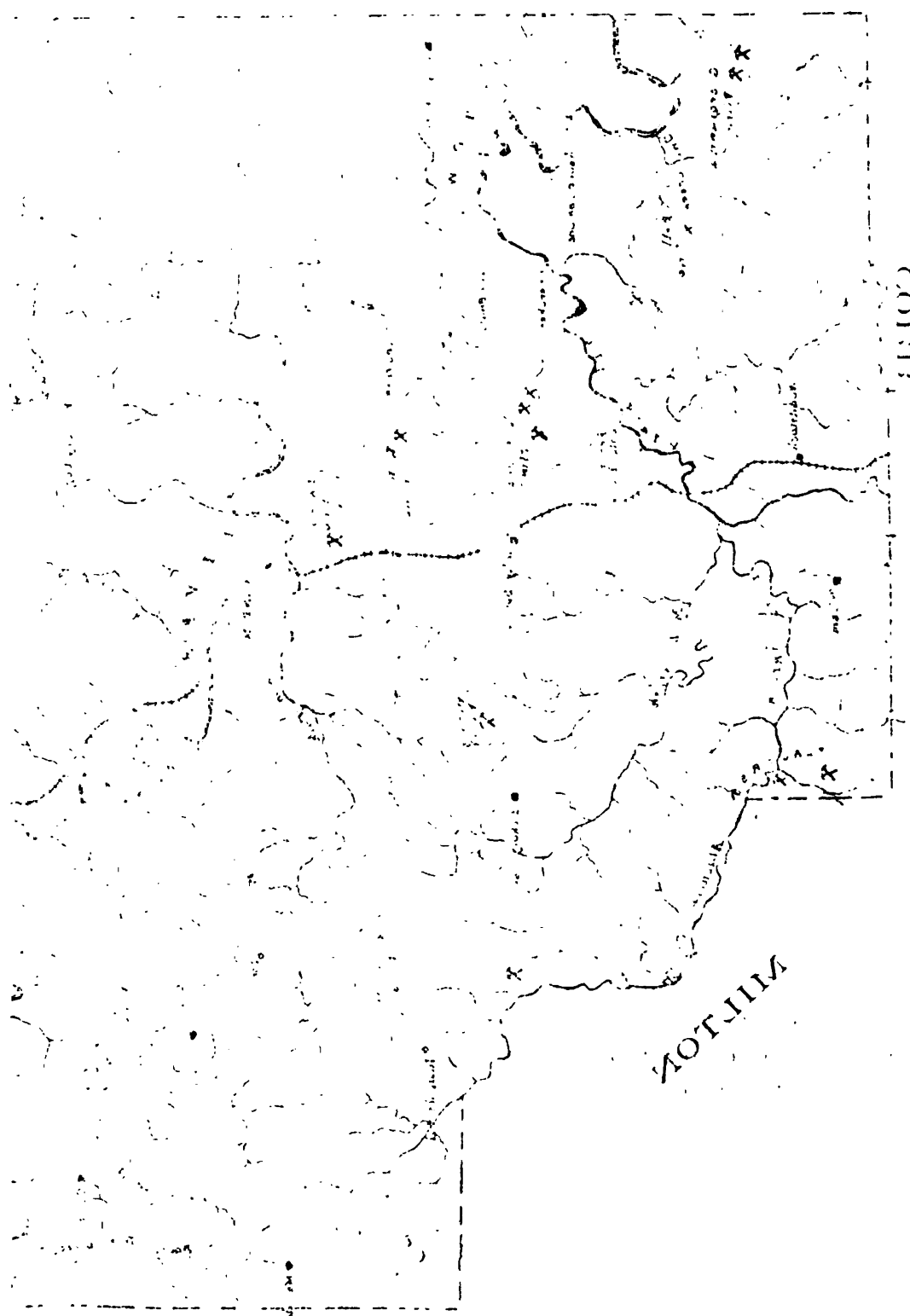


Map of Cherokee County, Showing Locations of Some of the Important Mines.

COLIER

MILTON

FORREST



tered by these companies, was the separation of the gold from the sulphides. As the greater part of the decomposed ore-bodies had now become exhausted, the value of the mine depended, almost entirely, on the economical working of the refractory ores, which, already, were known to exist, in great quantities. The difficulty was met and partially overcome, when the present company adopted the cyanide process of extraction. The final solution of the problem, however, was not attained, until the erection of the present chlorination-plant, which has enabled the company, to save almost the entire assay value of the ore.

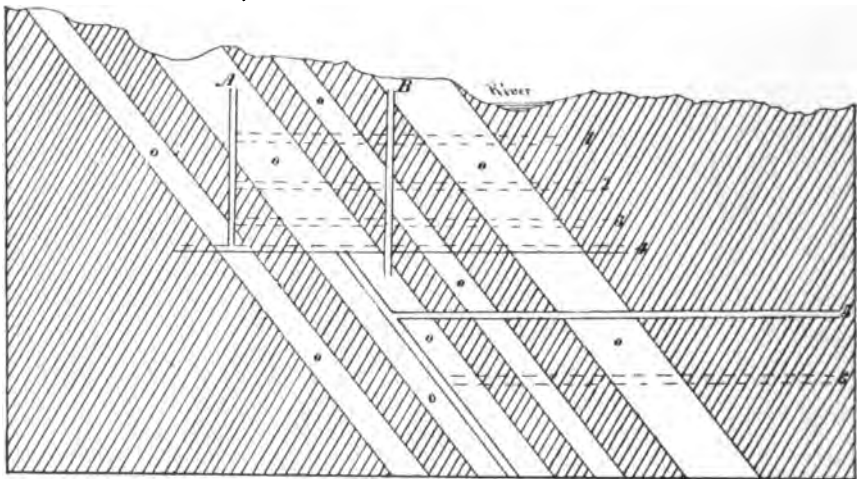
The Creighton Mining Company, who now operate the mine, are in possession of several lots, lying along the gold-bearing lead.

Two auriferous veins, running almost parallel, and about one hundred and fifty feet apart, the existence of which, on the property, has long been known, are termed, one, the Franklin, and the other, the McDonald vein. The former has been prospected and worked, almost continuously, for fully three-quarters of a mile along its outcropping; while the latter, being much smaller, has been prospected, at only a few points. The Franklin Vein strikes N. 60° E., and dips to the southeast, at an angle of about 40°. It is not a vein of continuous, uniform width; but, on the contrary, it consists of a series of "chimneys," or ore-shoots, connected together, by quartz stringers. The shoots are from fifty to one hundred and twenty feet, in length, with an average width of three feet, and of unknown depth. They dip, in the direction of the strike of the vein, at an angle of about 45°.

The Creighton Mining Company has worked four of these ore-shoots, to a depth, varying from two hundred to four hundred feet, by driving drifts, at one hundred-foot levels, stoping out the ore, from below. The portions of the vein, between the chimneys, are

left intact, as pillars, or supports, thus making frequent timbering unnecessary. A prospecting drift, at the time of our visit, was being made along the vein at the three hundred and fifty-foot level, with a view to locating other ore-bodies. It had already been extended, four hundred feet beyond the last ore-shoot, without accomplishing the desired result. Nevertheless, the outlook was sufficiently encouraging, to warrant further continuation of the work. At the depth of about two hundred feet from the surface, a large tunnel, one hundred and seventy feet in length, has been driven, from the Franklin to the McDonald vein. From this point, a drift, one hundred and fifty feet in length, was afterwards made, along the strike of the McDonald vein; but, at no place, was it found to be of sufficient thickness and richness, to pay for working.

Fig. 12



Vertical Section along the Strike of the Ore-bodies, Creighton Gold Mine, Cherokee County, Georgia. o. Ore-bodies. 1, 2, 3, 4 and 5. Levels. 6. Proposed Level. A and B. Shafts.

About half a mile southwest of the present works, and on the

same vein, is a recent prospecting-shaft, known as " Shaft No. 3." At the time of our visit, it had been extended, to the depth of seventy feet, where a drift, thirty feet in length, had been extended along the vein, and several tons of sulphides had been taken out. The vein, at this point, varies from two to three feet in thickness, and carries ore, which is said to assay, from fifteen dollars to twenty dollar per ton. Near by, is a long open cut, following the slope of the vein, where large quantities of the ore, from the oxidized portion of the vein, were mined, many years ago. Still further to the southwest, say one-third of a mile, and on the opposite side of the creek, is "Shaft No. 4," also a recent prospect. The shaft strikes the vein, which is, here, three feet in thickness, at the depth of seventy-two feet from the surface. The ore, at that depth, consists of undecomposed sulphides in quartz, carrying from \$20 to \$30 of gold per ton. The oxidized portion of the vein, at this point, has also been worked, for several yards along its outcropping; and it is said to have paid handsomely. It was learned, that it was the intention of the company, to begin mining operations at shafts 3 and 4, as soon as a tramway could be constructed to the mill.

The general appearance of the ore and the structure of the veins, differ but little, from place to place. The vein material consists of a milk-white quartz and thin layers of mica- and hornblende-schist, all impregnated with auriferous pyrite.

The veins correspond, in strike and dip, with the country-rock. The quartz, frequently, presents a banded appearance, due to the arrangement of the pyrite and quartz in layers. Fissures, from one to six inches wide, filled with calcite, are sometimes seen, to cut the gold-bearing veins, at almost right angles. Along the line of one of these fissures, occurs a displacement, or fault, of about fifteen inches.

The country-rock consists of mica- and hornblende-schists. The former is more abundant, than the latter; and, frequently, it carries garnets, which are quite plentiful, in the grayish variety of schists from shaft 3. Interlaminated with the hornblende-schist are thin layers of light-colored mica-schist, that give a peculiar banded structure to the otherwise dark-colored rock. No granite veins or dikes were observed, in the immediate vicinity of the auriferous veins; but they occur in the schists, a short distance west of the river.

The Creighton Mining Company has, now, in operation, at their mine, a very complete mining plant, which they have been perfecting for a number of years. It consists of a large stamp-mill, with ten concentrators, a chlorination plant, and all the necessary machinery, for mining and milling the ore. The mill is located on the right bank of the river, a quarter of a mile below the present working-shaft. A dam on the river, at this point,¹ gives a seven and one-half foot head of water, which, when concentrated into two large turbine wheels, generates sufficient power, to operate twenty-three stamps, ten concentrating machines, an electric plant and a duplex Rand air-compressor.

There are two stamp-mills, one, of twenty, and the other, of three stamps. The former is used, in crushing the ore, received directly from the mine, while the latter is employed, in working over the tailings, that accumulated, before the erection of the present plant. The stamps weigh 850 pounds each, and drop seven inches, at the rate of twenty-seven strokes per minute, crushing about thirty-five tons of ore, every twenty-four hours. The pulp, from the stamp, passes through a No. 7 slotted iron screen, over amalgamated plates, divided into four steps. About half of the

¹ See Plate XI.

gold is collected on the plates, and the remainder is carried off, in the sulphides, to the concentrators, where the greater part of the quartz and other gangue material is removed, leaving concentrates, consisting of nearly 80 per cent. sulphides. From three to five tons of these concentrates, assaying from \$20 to \$30 per ton, are produced daily. The concentrates are carried, in a small car, from the mill to the chlorination-plant, near by, and are there roasted, in a double-hearth reverberatory furnace, for twenty-four hours. This reduces the sulphides to a fraction of 1 per cent., and leaves the gold, in such a condition, that it can be readily acted upon, chemically. There are two of these furnaces, each having a capacity of two tons, every twenty-four hours.

From the furnace-room, the roasted concentrates are elevated to the third story of the building, and are there dumped into a small car, which conveys them to the chlorination-barrel. This consists of an oblong iron cask, lined inside with lead, and provided with a charging-door, which can be hermetically sealed. It is mounted on an axis, and revolves, slowly, while in use. The motion keeps its contents continually agitated, and greatly facilitates the chemical action, which would, otherwise, be very slow and incomplete. The barrel is charged, by placing into it one ton of the roasted concentrates, with a sufficient amount of water to render it semi-fluid. To this, is added about twelve pounds of calcium chloride (chloride of lime of commerce) and an equal amount of sulphuric acid. It is then sealed, and revolved on its axis, from four to six hours, when the gold is found, to have been acted upon, by the nascent chlorine gas, changing it into gold chloride.

The pulpy material is now, removed from the barrel to specially prepared filters, where the gold chloride is leached out with water; and the solution is then transferred to storage-tanks. From these

tanks, the solution passes to the precipitating-tanks, where the gold is thrown down, by means of ferrous sulphate. The gold precipitate is finally collected, dried, mixed with soda and borax, melted in a crucible, and cast into ingots.

The mine is equipped with machinery, for doing rapid and economical work. It is supplied with three engines. One, with a capacity of sixty horse-power, is used in removing the water from the mine, while the two lesser ones furnish power, for running the elevator, ore crusher and machine-shop. The drills are operated, by means of compressed air, supplied by the duplex Rand air-compressor, which is located at the mill. The air, thus used, performs the double office of doing work, and, at the same time, supplying fresh air to the mine.

The ore, from the mine, is elevated, in small cars, to the surface, where it passes, through the ore-crusher, into bins beneath. Here, the tram-cars, carrying the ore to the mill, are loaded.

The manipulation of the ore, after it leaves the mine, until it is received, at the chlorination-plant, is performed, almost entirely without manual labor.

An office, assay laboratory, commissary, blacksmith-shop, stables, miner's cottages etc., all substantially constructed and well arranged, make up the remainder of the Creighton plant. At the time of our visit, eighty-five hands, working in two shifts, of twelve hours each, were employed. The wages, received, vary, from 75 cents to \$2.50 per day, according to the class of labor. The entire cost of mining, milling and chlorination has been placed at \$2.70 per ton.

A selected sample of ore, taken by the writer, and subjected to assay, in the Survey laboratory, gave result, as follows:—

Ore sample, Creighton mine-----6.5 oz. (\$130.00) of gold per ton

THE COX PROPERTY

This property, located about one and one-half miles west of the Creighton mine, was prospected for gold, some four years ago. The work consists of a short tunnel, a number of shallow test-pits, and open cuts. There are exposed in the tunnel, two veins, one, three feet, and the other, eighteen inches, in thickness. The vein material consists of light-colored quartz, frequently porous and iron-stained, interlaminated with thin layers of schist. In dip and strike, the vein corresponds with the mica-schist of the country-rock.

Much float, or surface quartz, is found in the vicinity of the pits. This float is often honeycombed, and is said, to carry free gold. About three hundred yards below the tunnel, on a small stream, are to be seen remnants of a patented mill, used, in working a test of the ore.

THE SANDOW MINE

This mine is situated in the 3rd district, on lot 741. Gold was discovered, here, about 1840, in a quartz vein, on the side of a narrow, heavy wooded, steep ridge, which is washed on either side by two small creeks, known, locally, as Fowler's and Smithwick creeks. Mining operations were begun, almost immediately, and continued, for about three years. During this time, a great deal of ore was taken out, and milled in a small stamp-mill, erected near by. These

early workings are reported, to have been profitable, and to have given satisfactory returns, as long as the surface-ores were used.

Two gold-bearing veins occur, here. One only, however, was exposed to view. This vein, where accessible to examination, is about eighteen inches in thickness, and dips with the country-rock, mica-schists, at a high angle, to the southeast. It is made up of a reddish- and brownish-colored glassy quartz, frequently laminated, and containing small cavities and cracks, filled with a red dust, of iron oxide, which readily soils the hands. This product evidently results from the oxidation of pyrite, this mineral being still found, unaltered, in the more compact portion of the ore-body.

The old works, now more or less filled with earth, consist of three tunnels, varying from one hundred to two hundred and fifty feet in length, besides a number of shafts and open cuts. Gold occurs in the gravel, along the creeks, on either side of the ridge; but not in sufficient quantities, to make placer-mining profitable.

THE S. R. SMITH PROPERTY

On the S. R. Smith Property, *lot 701, 3rd district*, adjoining the Sandow property, are to be seen, on a gradually sloping hillside, near a small stream, some old excavations. These were made, many years ago; and they are said, to have exposed a rich pocket of gold, which was, however, soon exhausted, and the work was finally abandoned.

The material, from the dump, and the loose surface-rock, in the vicinity of the excavations, indicate, that gold occurs, here, in hornblende-schist. On the opposite side of the ridge, a recent pros-



ORE BODY IN THE MACOU MILL CUT, LABELLE MINE, NEAR CANTON, CHEROKEE COUNTY, GEORGIA.



pecting-tunnel has been driven into the hill, exposing a white quartz vein in mica-schist. The residual earth, along the ridge, in places, and also the gravel in the stream, at its base, which has been worked, to a limited extent, carry more or less gold.

THE RICHARDS PROPERTY

This property, which has been extensively prospected, lies on the opposite side of Fowler's creek, from the Sandow mine. The auriferous veins, found here, are probably a continuation of the veins, occurring on the adjoining lots. They conform, in strike and dip, with the schists, and carry more or less pyrite, even near the surface. But little reliable information could be secured, concerning the amount and value of the ore, mined. Nevertheless, the extent of the work would seem to warrant the conclusion, that the ore, at one time, was profitable; or, at any rate, that it gave very satisfactory evidence of future profitable returns. The tunnels, open cuts and shafts, most of which are, now, inaccessible, extend along the ridge, for many yards. At only one or two points, was the vein exposed to view; and, even there, it was found impracticable, to make a satisfactory examination of it, or to collect specimens of the ore, that could be relied upon, for giving anything like a fair average of the ore-body.

Near the excavations, at the junction of Fowler's and Smithwick creeks, on this property, are to be seen the remains of old placer-mining, long since abandoned. There is exposed, here, also, in the bottom of the creek, a band of schist, two or three feet wide, im-

pregnated with pyrite, which has attracted some attention, and which is supposed, by some prospectors, without apparently very good reason, to be the source of the gold, found in the placer.

THE LATHAM PROPERTY

This property, *lot 805, 3rd district*, is situated on the Canton road, a short distance west of Orange Postoffice. Gold was discovered, here, in a quartz vein, about 1852, by Jack Latham, who mined and milled a few tons of the ore, from which he is said to have obtained 80 pennyweights of gold. Nothing further was done, towards developing the property, until about seventeen years ago, when Horn & Hoskins did some prospecting; but their work was not sufficiently extensive, to give any definite idea, concerning the value of the gold-bearing vein.

Ten years afterwards, Col. Moore, who was then operating the Franklin mine, had his attention directed to the property. Under his management, a shaft, fifty feet deep, was sunk on the vein; and some high-grade ore is reported, to have been taken out; but, for some reason, the work was soon abandoned.

During the summer of 1893, L. L. Thomason, of Chattanooga, took up the work, discontinued by Col. Moore. He continued mining operations, for a number of months, and, in the meantime, erected a small stamp-mill on the property, sunk new shafts, and took out and milled several tons of ore. At the time of our visit, the work had been discontinued, for months, and the deeper shafts were partially filled with water.

Three gold-bearing veins occur here, all running parallel to, and

within a few yards of, each other. Vein No. 1, on which the greater part of the work has been done, is twenty-four inches wide, where exposed in an open cut. At the bottom of the deepest shafts, which extend only to the depth of fifty feet, it is said to attain a thickness of more than thirty inches. It consists of a somewhat laminated iron-stained quartz, dipping with the mica-schist, at a high angle, to the southeast. Veins Nos. 2 and 3 lie about from twenty to sixty feet respectively west of vein No. 1. The former is eighteen inches in thickness, while the latter is only ten inches. Neither has been prospected, to any extent, and little is known of their importance.

Samples of ore from this property were taken, by the writer, which, assayed in the Survey laboratory, yielded the following results :—

1. Ore sample, Vein No. 1066 oz. (\$1.32) of gold per ton
2. Ore sample, Vein No. 218 oz. (\$3.60) of gold per ton

LOT 208, 3RD DISTRICT

On the adjoining lot, *No. 208*, a shaft, fifteen feet deep, was sunk by Mr. Thomason, during August, 1893. There is exposed, here, an excellent-looking, cavernous, iron-stained quartz vein, two feet in thickness. Some ten tons of ore are said to have been taken from the excavation, and milled ; but, with what results, we were unable to ascertain. The nature of the vein, and the general appearance of the ore, there exposed, certainly warrant further expenditure of money, in development.

FRANK BURT'S PROPERTY

This property, located, a short distance northeast of the Latham property, has, also, been prospected, to a limited extent, for gold. An old shaft, about thirty-five feet deep, is to be seen, here, near the top of a ridge, in which there is reported to be a gold-bearing quartz vein. As the excavation was inaccessible, no examination of the ore could be made.

THE RUDICIL MINE

The Rudicil Mine, consisting of both placer-working and vein-prospecting, is situated on *lot 10, 2nd district*. The placer-mining, most of which was done, some fifty years ago, occurs along a small stream, flowing into Mill creek. The works are only about two hundred and fifty yards long by fifty, wide; yet, within this small area, much gold is said to have been taken out. Nuggets, weighing as much as seventy pennyweights, are reported to have been found, here. At the upper end of the placer, five shafts, varying from ten to twenty feet in depth, have been sunk, with a view to locating the vein, which has supplied the auriferous gravel, below. It is claimed, that one of these excavations struck a vein of sulphides, from four to six feet wide, assaying about \$3 per ton. The truthfulness of this statement, however, we were unable to verify, on account of the shafts being filled with water.

Half a mile to the northeast of the Rudicil mine, on an adjoin-

ing lot, some recent prospecting has exposed a quartz vein, from one to four feet, in thickness. It carries more or less pyrite; and it is said to assay about \$3 in gold per ton.

T. N. WESTBROOK'S PROPERTY

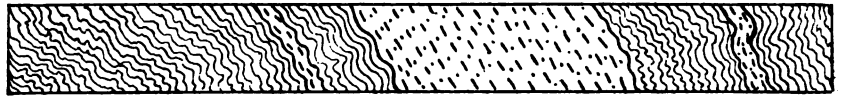
On *lot 276, 2d district*, owned by T. N. Westbrook, can be seen, along a small branch, near where it empties into Alaculsa creek, the remains of some old placer works, that were made, directly after the late war. The entire area, over which they extend, does not exceed three acres. It is said, that a miner could make, here, during the early working of the placer, from two to three penny-weights of gold per day, by means of a long-tom or a rocker. No gold-bearing vein has, yet, been discovered, in the immediate locality, however; though a number of test-pits have been dug.

THE WORLEY MINE

This mine is located on *lots 459 and 460, 15th district*. The early workings consisted of placer-mining, which, though limited in area, and soon exhausted, we learn was very profitable. About ten years ago, some rich ore-shoots were discovered on the property, which were, afterwards, worked to the depth, of several feet, below the surface. At this point, a stratum of decomposed schist, forming a quicksand, was struck. This quicksand, on account of the weight

of the superincumbent rock, flowed into the excavation, as rapidly as it could be removed, and thereby made it practically impossible, with the means, then at hand, to follow the ore-bodies to greater depths. It was not until about two years ago, when the property fell into the hands of the Cherokee Milling and Mining Company, that this difficulty was overcome, and the sandstone was penetrated.

Fig. 12½



Cross-section through the Worley Gold Mine, Cherokee County, Georgia, Showing Auriferous Quartz Veins in the Crystalline Schists, Indicated by dots and Broken Lines.

At the time of our visit to the property, the company had just erected a first-class prospecting plant, consisting of mill, hoisting-engine, pumps etc., and had already done considerable exploration. A tunnel, five hundred feet long, had been driven into the hill, exposing three gold-bearing veins,¹ only one of which, however, was of sufficient size, to justify further examination. They all run parallel, and correspond, in strike and dip, to the country-rock. The larger one has been worked, for twenty feet, on either side of the tunnel, by driving drifts, and stoping out the ore, from above. Its greatest thickness is about four feet; but it greatly decreases in width, at the end of the drifts, where it becomes so contracted, as to make further mining unprofitable. Ninety-two tons of ore, taken from this vein, yielded, in their Huntington mill, \$4.08 in gold per ton. The vein material consists of mica-schists, with thin layers of quartz, all more or less decomposed, and easily mined with a pick. Hydraulic mining was first attempted, here, by the Cherokee Milling & Mining Co.; but it was finally abandoned, as unprofitable.

¹ See Fig. 12½.

The writer took a sample from this mine, which assayed, in the Survey laboratory, as follows: —

Ore sample, Worley Mine----- .50 oz. (\$10.00) of gold per ton

THE CHESTER PROSPECT

This property, owned by George T. Chester, of Buffalo, N. Y., is situated in the extreme southeast corner of the county, *on lots 804 and 805, 2nd district*. The work consists of a seventy-five-foot shaft and cross-cuts, exposing an auriferous quartz vein.

THE DAVIS MINE

The Davis mine is situated *on lot 22, 15th district*, two miles south of Canton, near the Marietta & North Georgia R. R.¹ Three parallel gold-bearing quartz veins occur here outcropping about four hundred feet apart. The one, furthest to the west, has four shafts sunk on it, varying in depth, from thirty to fifty feet. At the bottom of two of these, drifts have been extended along the vein for fifty feet or more, and the ore has been removed. The thickness of the ore-body is quite variable, in the different shafts; but, at no place, does it exceed two feet. The vein, consisting mainly of

¹ Now the Atlanta, Knoxville & Northern R. R.

quartz, somewhat laminated, and frequently showing free gold, dips with the country-rock, at a high angle, to the southeast.

The east vein has one shaft, eighty feet deep, sunk, during the summer of 1893. Its upper portion resembles very closely, the vein, lying further to the west; but, near the bottom, where it is said to attain a thickness of four feet, it contains much pyrite. A test of the ore, made on a Crawford mill, erected near the shaft, was unsatisfactory. Whether this result was due to the low grade of the ore, or to the imperfect working of the mill, we are uncertain. Should further prospecting reveal valuable deposits of ore, here, a small branch, near by, could be utilized, in furnishing water to supply the batteries of a stamp-mill.

THE LA BELLE MINE

This mine, owned by the La Belle Mining Company of New Orleans, is located on *lots 157 and 205, 15th district*. Mining operations began, here, in 1888; but they were discontinued, during the following year.

The main part of the works is *on lot 205*, and consists of a shaft eighty-four feet deep, at the bottom, of which, two drifts have been cut, along the vein, for forty feet, each way; and the ore has been stoped out, above. Near by, and located a short distance east of the vein, is another shaft, sixty feet deep. It was the original intention, to extend this shaft, so as to strike the vein, on the three hundred-foot level, and then work out the ore, above; but for some reason, it was never completed. The vein, where examined on the surface, dips with the country-rock, mica-schist, at a high angle, to



DAM AND MILL ACROSS THE ETOWAH RIVER, CREIGHTON GOLD MINE, CHEROKEE COUNTY, GEORGIA.



the southeast. It is from fifteen to twenty inches, in thickness, and consists of thin layers of quartz and mica-schist, the former frequently having their surfaces thickly specked with free gold; while the latter, thoroughly decomposed, rarely shows free gold; but, nevertheless, it pans well.

On lot 157, is a shaft, thirty-six feet deep, and an open cut, seventy-five feet long and twelve feet deep. These excavations expose a vein, very similar to that, found *on lot 205*, and which is probably a continuation of the same. The ore, taken from these different excavations, was milled, near the shafts, *on lot 205*.

The five stamp-mill, erected here, still remains; but it is, now, in a somewhat dilapidated condition; and it would have to be entirely overhauled, before it could be again used. The water, which was sufficient, to supply the batteries of the mill, for only half the time, was taken from the small branch, at the foot of the hill. Had the mill been located on Blanket's creek, only a few hundred yards away, ample water could have been secured, to run the mill continually, and the expense of milling the ore would have been lessened, thereby. The entire works seem to have been poorly planned, and imperfectly carried out, which had evidently much to do, with the unsuccessful operations of the mine.

An ore sample, from *lot 157*, was taken by the writer, which gave the following results, in the Survey laboratory:—

Ore sample, *lot 157*, La Belle Mine-- .122 oz. (\$2.44) of gold per ton

J. C. CASTEEL'S PROPERTY

The property of J. C. Casteel, *lot 204, 15th district*, adjoining the La Belle property, on the east, has two small prospecting-pits, exposing a gold-bearing vein, eighteen inches, in thickness. Average samples of ore, taken from these excavations, assayed \$3.58 per ton.

A sample, taken by the writer, and submitted to assay, in the laboratory of the Survey, resulted as follows : —

Ore sample, J. C. Casteel's property -- .13 oz. (\$2.60) of gold per ton

THE MACOU PROPERTY

Still further to the northeast, *on lot 158*, is another prospect, the Macou property. There are two veins here, located about two hundred feet apart, and running, approximately, parallel with each other. The one, lying further to the east, has two shafts, each about forty feet in depth, and connected by an open cut. The ore-body is from three to four feet, in thickness, and is made up chiefly of schist, with comparatively little quartz.¹ The eastern vein has been exposed, at one point, by an open cut, thirty feet long and thirteen feet deep. The character of the ore and the size of the vein, found here, differ but little, from that of the western vein. The greater part of the gold, however, probably occurs in the thin layers of quartz, in the decomposed schists.

¹ See cross-section, Fig. 13.

Fig. 13



Cross-section through the Macou Gold Mine, Cherokee County, Georgia, Showing the Position of the Auriferous Quartz Veins in the Crystalline Schist, Indicated by Dots and Broken Lines.

On the property, are to be seen the remains of an old ten-stamp mill, erected in 1886. It, like the one, located *on lot 205*, being, also, insufficiently supplied with water, was operated, only for a short time, and, eventually, was abandoned. No reliable information, concerning the results of these mill-tests, could be secured.

The La Belle, Casteel and Macou prospects are all located along the same ridge, on adjoining lots, and might be considered, as different openings, on the same veins. It is not meant, by this, however, that these veins are continuous and unbroken; but, on the contrary, it is quite likely, that they are frequently interrupted by barren schists, and form, what may be termed, a series of greatly elongated ore-shoots, all having the same general direction.

THE CULP PROPERTY

On the Culp Property, *lot 301, 15th district*, a limited amount of prospecting was done, some forty years ago. It is reported, that some rich pockets of gold were discovered, here; but that they were soon worked out. None of the excavations are, now, accessible, except one shaft, forty feet deep, which exposes a gold-bear-

ing vein, about four feet, in thickness. The vein is made up of porous, iron-stained quartz, separated by thin layers of mica-schist. It is quite a promising looking vein; and it should be investigated further.

THE PUTNAM MINE

The Putnam Mine is located on Blanket's creek, *lots 350 and 371, 15th district*, about half a mile below the Culp property. It has been worked, chiefly as a placer, although a remarkably rich ore-shoot was discovered, here, also. Gold was first found in the gravel, in 1842. Shortly after this, mining operations began; and they were continued, from time to time, until the placer was exhausted.

During these early workings, it is said that an average miner would make, from fifteen to twenty-five pennyweights of gold per day. Much of the gold was fine; but there were, also, found some nuggets, the largest of which is reported, to have weighed thirty-three pennyweights.

The entire area, covered by the old workings, does not exceed five acres; yet, much of this area has been worked over twice; and some portions of it would probably pay, for working even a third time. Much of the placer lies along the creek, where the land is low, and only a few feet above water-level. The richer part of the deposit is said, to have been found, on a gradually sloping hillside. The gold is supposed, to have been derived, from the breaking down of auriferous veins, located near by. This supposition seems quite plausible, when it is remembered, that, during the early placer-workings, a rich ore-shoot was found, near the upper edge

of the placer, from which, it is said, four men, took, in one afternoon, seven and one-half pounds of gold.

Many of the statements, concerning the richness of this property, will appear almost fabulous; but they are made, most frequently, by men, whose veracity cannot be questioned; and, hence, they must contain much truth. There can be no doubt, but that the aggregate output of the mine has been many thousand pennyweights. There has been only a limited amount of vein-prospecting on the property. However, it would seem, that the finding of such a rich ore-shoot should warrant further investigation, on this line.

THE CHEROKEE MINE

This mine, situated *on lot 428, 15th district*, was worked, as early as 1854, by Messrs. McConnell & Putnam. This firm erected a twelve-stamp mill, on the property, and successfully operated the mine, for three years, when it was sold to a Boston company, which continued the work, until the breaking out of the late war. Since then, no work, with the exception of a limited amount of prospecting, has been attempted.

Both vein- and placer-mining have been carried on, here. The latter was confined, principally, to the bed of a small stream, that runs at the base of the ridge, on which the veins are located. The gold, from this, has long since been exhausted. There is said to be a number of gold-bearing quartz veins in the ridge, all running parallel, and dipping with the schist. The excavations, however, along these veins, are in such shape, that exposures of only one or

two of these were possible to be examined. They are quite variable, in thickness, and consist mainly of quartz, with iron-stained cavities. There are numerous shafts and tunnels, at various points, along the ridge, from which many hundred tons of valuable free-milling ore were taken.

The mine is reported, to have paid handsomely, as long as the oxidized portion of the veins was worked; but when this class of ore was exhausted, they were forced to shut down, not having suitable machinery for working the sulphides. There is little doubt, but that there exist, here, considerable quantities of ore, that might be worked with profit, if the mine were judiciously managed, and the necessary gold-saving machinery were used.

Since the above was written, the property has passed into the hands of a Chicago company, with C. A. Dye, as manager, who is now actively engaged, in cleaning out old tunnels and shafts, with a view of beginning mining operations at an early date.

Four samples, taken from this mine, by the writer, assayed in the Survey laboratory, as follows:—

- No. 1. Ore sample, Cherokee Mine-- .10 oz. (\$2.00) of gold per ton
- No. 2. Ore sample, Cherokee Mine-- .125 oz. (\$2.50) of gold per ton
- No. 3. Ore sample, Cherokee Mine-- .425 oz. (\$8.50) of gold per ton
- No. 4. Ore sample, Cherokee Mine-- .550 oz. (\$11.00) of gold per ton

THE McCANDLESS PROPERTY

The McCandless Property, *lot 61, 15th district*, was first prospected for gold, in 1887. The property shows two small shafts and an

open cut, exposing a gold-bearing quartz vein, about twelve inches in thickness. The vein, together with the mica-schist, the country-rock, stands almost perpendicular, and strikes northeast and southwest. The quartz carries considerable pyrite ; but it rarely shows free gold. We learned, that about a hundred tons of this ore was milled, averaging nearly \$5 per ton.

An ore-sample, taken from the McCandless property, by the writer, yielded, on assay, in the Survey laboratory, as follows : —

Ore sample, McCandless Property-- .120 oz. (\$2.40) of gold per ton

LOTS 63, 64 AND 81, 15TH DISTRICT

Downing's creek, which has its head near this property, has been the scene of considerable placer-mining, especially *on lots 63, 64 and 81.*

THE SIXES MINE

The Sixes Mine, lots 150, 212, 221 and 284, 15th district, is one of **the** best known placer mines in Cherokee county. Gold was discovered in a small stream, now known as Sixes creek, prior to the removal of the Indians, from this section of the country. As early as 1834, extensive mining was carried on, here. During these early workings, an average miner is said to have made, from fifteen to twenty pennyweights of gold, per day, by the use of a long-tom, or a rocker.

Fig. 14

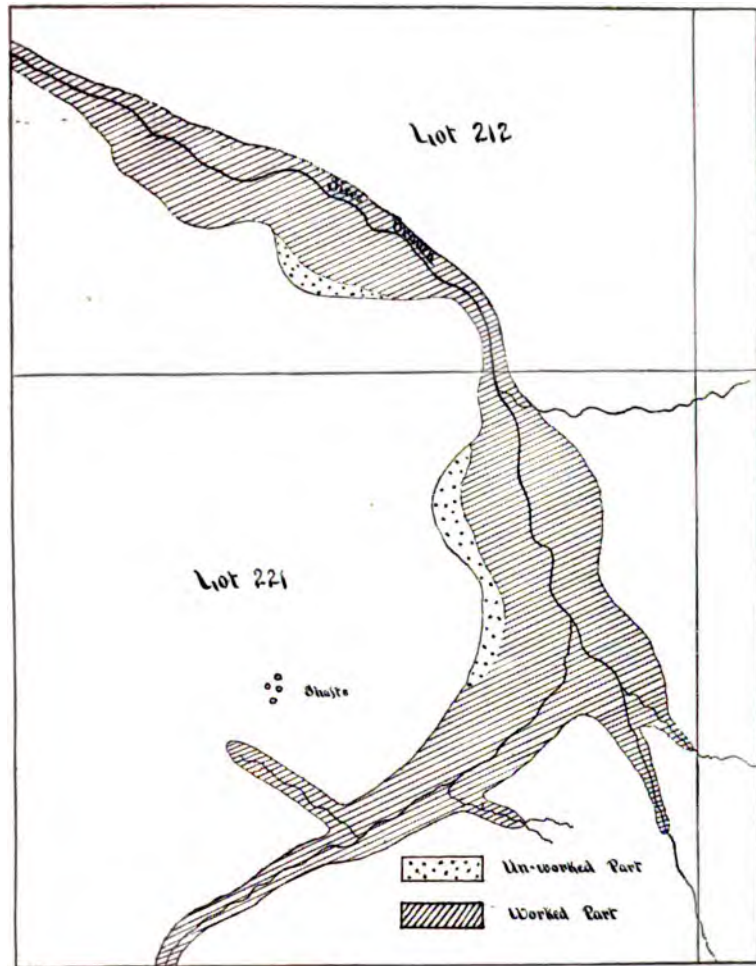


Diagram Showing the Present Condition of the Sixes Placer Mine,
Cherokee County, Georgia.

The entire worked portion of the placer does not exceed five acres ; yet, from this small area, if reports are to be credited, many thousand pennyweights of gold have been obtained. Much of the

placer has been worked twice, and even three times ; and it is not at all improbable, that there may be certain portions of the mine, even now, containing paying deposits. Both coarse and fine gold occur, here ; but the latter is more abundant. Many nuggets, which are usually rough and angular, have been found ; the largest of which is reported to have weighed ninety pennyweights.

A considerable amount of money and labor has been expended, in prospecting for the vein, that has supplied the placer ; but, so far, the work has met with only partial success. A number of shafts and tunnels have been made, on the hillside, near the upper edge of the placer. In one of these excavations, near a contact of granite and hornblende-schist, is a vein or layer of mica-schist, about three and a half feet wide, which carries gold. It is possible, that this gold-bearing schist is a portion of the vein, which has fed the placer. However, if this be true, it must, in places, have contained rich pockets or ore-shoots, that were removed by denudation, and its auriferous contents, distributed along the stream below.

Fig. 15



Cross-section through the Sixes Gold Property, Cherokee County, Georgia, Showing an Auriferous Quartz Vein in Granite, near the Line of Contact with the Crystalline Schists.

The geological formations, occurring in the vicinity of the Sixes Mine, are entirely different, from any, heretofore examined. The hill, on which the vein-prospecting has been carried on, consists of granite and hornblende-schist ; while the formation, lying to the east, and forming the greater portion of the bed-rock of the placer, is mica-schist. The granite is fine-grained, and of a light color ;

and it frequently contains more or less pyrite, unevenly distributed throughout the rock-mass. All the formations strike northeast and southwest, and dip, at an angle of about forty degrees, to the southeast.

THE COGGINS PROPERTY

This property lies east of the Sixes mine, *on the adjoining lot, No. 211, 15th district*. It was worked to a limited extent, some years ago, as a placer ; but, recently, it has attracted quite a little attention, as a vein-prospect. Three shafts, varying from twenty to eighty feet in depth, have been made, near the edge of the old placer-workings, on a very rich gold-bearing vein of schist. When the property was examined, by the Survey, the shafts were too old, to even permit of an examination of the ore *in situ*.

A heap of thoroughly decomposed mica-schist, lying near the shafts, showed the nature and character of the ore-body. This consisted mainly of mica and kaolin, with but little quartz ; yet, when panned, it showed a very surprising return, in gold. The nature of this vein seems to be very peculiar ; and it should be further investigated.

THE CLARKSON MINE

The Clarkson Mine, owned by a St. Louis Company, is located about three quarters of a mile east of the Sixes mine, *on lot 225,*

15th district. Work was begun, here, in 1871 ; but it was continued, only a short time. The prospecting consists of two tunnels, one, fifty feet, and the other, 350 feet long, and a shaft, eighty feet deep. Several tons of ore were taken from these excavations, and milled, on a stamp-mill, erected near by. In a small open cut, there is an exposure of the vein, which, at this point, presents a width of about two feet. It consists of a dark-colored, laminated, granular quartz, resembling quartzite.

Samples, from this mine, were taken by the writer, and three assays, made in the Survey laboratory, resulted, as follows :—

No. 1. Ore sample, Clarkson mine .12 oz. (\$2.40) of gold per ton

No. 2. Ore sample, Clarkson mine .125 oz. (\$2.50) of gold per ton

No. 3. Ore sample, Clarkson mine .125 oz. (\$2.50) of gold per ton

LOT 208, 15TH DISTRICT

On the adjoining property, *lot 208, 15th district*, belonging to James Haynes, is another prospect, where a gold-bearing vein of mica-schist, about three feet in thickness, is exposed in a small shaft. The exposure was too limited, to give any definite idea, concerning the extent, or the general character of the vein.

A sample of ore from this property was taken by the writer, which gave the following result, on assay in the laboratory of the Survey :—

Ore sample, Haynes Property -- .15 oz. (\$3.00) of gold per ton

THE McLAIN PROPERTY

On the McLain Property, *lots 721 and 723, 21st district*, are two prospecting shafts, exposing a gold-bearing quartz vein, about eighteen inches, in thickness. Several tons of this ore, milled at the Georgiana Mine, are said to have yielded \$12 per ton. The excavations were made, some five years ago; and, at the time of our visit, they were so filled with earth, that no satisfactory examination of the vein could be made.

About three-fourths of a mile east of the above prospects, on the same property, *lot 723*, are other openings, on a vein, called the Magnetic Vein. These veins continue to the northeast; and they have been prospected, on the Clayton and Foster properties.

THE EVANS PROPERTY

This property, consisting of *lots 792 and 793, 15th district*, was first worked, as a placer. We were informed, that this deposit, which occurs in the alluvium, along Rose creek, has been very rich. It is now practically exhausted.

Fig. 16



Cross-section through the Evans Gold Property, Cherokee County, Georgia, Showing the Auriferous Quartz Veins in the Crystalline Schists, as Indicated by the Dotted Lines.

In the last few years, four well-defined quartz veins have been discovered on the property, all carrying more or less gold. The vein, lying furthest to the east, is known as the Bralley Vein, because of its previous development, on the Bralley property, lying about two miles to the southwest. The vein is exposed, in a recent shaft, on the hillside, to a depth of twenty feet. It is only a few inches, in thickness, and is formed of brownish-colored quartz, dipping with the mica-schist, at a high angle, to the southeast.

About a hundred and fifty feet west of the Bralley vein, and running parallel with it, is the Copper Vein, so called, from its outcroppings resembling gossan. It carries only a small amount of gold; and it has received but little attention from the prospector. The Sandstone Vein lies two hundred feet, still further to the west, and is to be seen, in some recent excavations, along the hillside. Several tons of ore have been taken from the vein, and milled, at a small stamp-mill, erected on Rose creek, a few hundred yards away. The vein varies from one to three feet, in thickness, and consists of milky quartz, with crystals of pyrite. It does not appear to be a continuous vein; but, on the contrary, it is formed of a series of greatly elongated lenses or ore-bodies, running parallel with each other, and corresponding, in strike and dip, with the mica-schist.

The most western vein, known as the Magnetic Lead, attains a thickness, in places, of many feet. It carries but little gold; nevertheless, it is an important vein, on account of its continuity and conspicuous outcroppings, which enable the prospector to trace it, from one lot to another, and hence to locate, with a considerable degree of certainty, the more valuable auriferous vein, always associated with it.

The writer took samples from this property, which were assayed, in the Survey laboratory, with the following results : —

No. 1. Ore sample, Evans Property .20 oz. (\$4.00) of gold per ton

No. 2. Ore sample, Evans Property .25 oz. (\$5.00) of gold per ton

No. 3. Ore sample, Evans Property .25 oz. (\$5.00) of gold per ton

THE BELL PROPERTY

The Bell Property, *lots 329 and 900, 15th district*, joins the Evans property, on the southwest, and is traversed, by the same veins. The greater part of the vein-mining, on the property, was done, before the late war, by Fields, Bell & Co., who erected a twelve-stamp mill, and worked the sandstone vein, for three hundred yards, along its outcroppings, to the depth of fifty feet.

Fig. 17

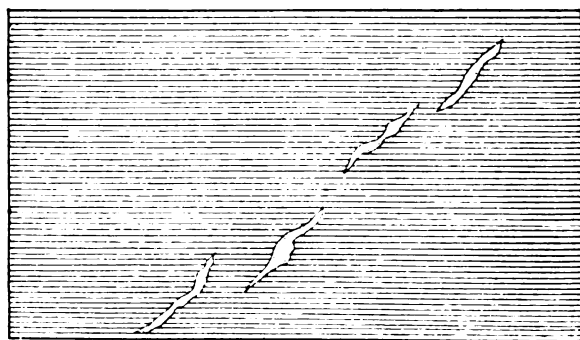


Diagram Showing the Ore-bodies on the Bell Gold Property, Cherokee County, Georgia.

The vein here, as on the adjoining property, consists of a series of parallel short veins, or ore-bodies, having the same dip, but each

occupying different planes.¹ These bodies are usually several yards in length; and they are said to vary, from a few inches to six feet, in thickness. The Bralley Vein and the Copper Vein have also been prospected. On the latter is a shaft, a hundred and thirty feet deep, which supplied the water for the stamp-mill. All the excavations were inaccessible; and no satisfactory examination of the ores could be made.

THE COX PROPERTY

This property, *lot 901, 15th district*, lies immediately south of the Bell property. The various veins, traversing the adjoining properties, seem to converge here, and form a gold-bearing zone, not over one hundred feet in width. Within this zone, are a number of small veins, consisting of mica-schist and thin layers of quartz, rich in gold. At a point, near the summit of the ridge, are to be seen, seven shafts, within a radius of seventy-five feet. These are all said to have exposed gold-bearing veins. There has been considerable prospecting, done on the property, from time to time, and several tons of the ore have been milled; but, at the time of our visit, all the excavations were inaccessible, and no samples were secured for assaying.

The present owner of the property, R. C. Freeman, of Goldsboro, N. C., has forwarded to Prof. Yeates, State Geologist, a number of assay reports of the Cox ore. These assays, made at the U. S. Assay-office, Charlotte, N. C., run from \$220 to \$350 per ton.

¹ See fig. 17.

Such assays, as these, cannot be relied upon, for giving any definite idea of the ore-body as a whole; for it is quite likely, that they were selected only from the richer parts of the vein.

THE WILLIAMS PROPERTY

The Williams property, now owned by Col. J. H. Moore and others, of Canton, lies immediately south of the Cherokee Mine, *on lot 437, 15th district*. There are to be seen here, besides the remains of an old placer, several tunnels and shafts, made many years ago; and, also, a number of recent open cuts, exposing auriferous veins. The old works are reported to have yielded much gold; but the operators were compelled to abandon them, on account of the appearance of pyritic ores.

Along the western hill-slope, several gold-bearing veins occur, varying, in width, from a few inches to many feet. These ore-bodies consist of quartz stringers, separated by thin layers of schist. The recent prospecting excavations are all superficial. Nevertheless, they expose the veins, well enough, to show ore-bodies, sufficiently inviting in character, to induce further development.

Two assays of samples, taken by the writer, from this property, vary somewhat widely. Both were made in the laboratory of this Survey, with the following results:—

- No. 1. Ore sample, Williams Property, Lot 437,
15th District10 oz. (\$2.00) of gold per ton
- No. 2. Ore sample, Williams Property, Lot 437,
15th District..... .025 oz. (\$0.50) of gold per ton

THE BAILEY PROPERTY

The Bailey property, *lot 971, 15th district*, was first prospected, in 1840; and it has, at present, in the way of development, numerous shafts and open cuts, none of which attain a depth, of more than fifty feet.

The so-called Bailey Vein reaches its greatest size, on this property. It consists of a zone of mica-schist, fifty or seventy-five feet wide, in which appear a number of quartz veins, varying in thickness, from a fraction of an inch to three feet. The quartz and this schist walling, carry gold, in considerable quantities. Numerous quartz boulders, sometimes weighing as much as five hundred pounds, which have originated, from the breaking down of the ore-body, are to be seen scattered over the surface of the cultivated field. Many of these show free gold; and, at the time of our visit, they were being collected, by the owner of the property, and beaten, in a common hand mortar. We were shown several hand specimens, chipped from these boulders, or taken from the vein, each containing several grains of gold. This property is considered, to be quite valuable; and it, probably, would have been developed, before now, had it not been held, at too high a figure.

THE KELLOGG MINE

This mine, located *on lot 1,113, 15th district*, is noted, principally, for its placer workings. Gold was discovered, many years ago, along a small stream, running through the lot; and its bottom has

been worked, almost continuously, ever since. The entire output of this placer is estimated, at 100,000 pennyweights. The most valuable part of the placer has evidently been exhausted; but there are still being found occasionally, some nice nuggets. These works continue into the adjoining property, known, as the Williams property.

Some seven or eight years ago, considerable prospecting was done, on this property, by a New York Company. In one of the excavations, made by the company, was exposed, at the time of the writer's visits, a rather compact vein of light-colored quartz, about two feet in thickness, which dipped with the country-rock, to the southeast, at an angle of about 60°.

A sample of ore, taken from this vein, by the writer, gave the following assay result, in the laboratory of the Survey: —

Ore sample, Kellogg mine----- .125 oz. (\$2.50) of gold per ton

THE WILLIAMS PROPERTY

An area of about six acres has been worked on the Williams property, *lot 1,120, 21st district*, and many valuable gold nuggets are reported, to have been found, here. One of the great troubles, in working the mine, is the difficulty in conducting water to the elevated portions of the placer, which, in places, extends along the hillside, several feet above the present bed of the stream. A number of veins, carrying gold, have been discovered on this property.

Two samples of ore, taken, by the writer, from this property, and subjected to assay, in the Survey laboratory, gave results as follows: —

- No. 1. Ore sample, Williams Property, Lot 1,120,
21st District.....375 oz. (\$7.50) of gold per ton
- No. 2. Ore sample, Williams Property, Lot 1,120,
21st District.375 oz. (\$7.50) of gold per ton
-

THE T. D. EVANS PROPERTY

Several shafts and tunnels are to be seen, on the ridges, on either side of the creek, *on lots 829 and 900, 21st district*, exposing gold-bearing quartz veins, adjacent to the placer. Only one or two of these excavations, however, were accessible. The veins exposed to view, are formed of iron-stained, porous quartz; and they vary, from one to three feet, in thickness. They carry more or less pyrite, and correspond, in dip and strike, with the schist. Some very rich ore-shoots are reported, to have been found here, and to have been worked, to the depth, of several feet from the surface. The ore, in some instances, is said to have milled, as much as \$60 per ton.

WILLIAM POOR'S PROPERTY

On the Poor property, *lots 760 and 826, 21st district*, have been discovered, in the last few months, three different gold-bearing veins. The east vein is exposed, in a recent twenty-five foot shaft, near Mr. Poor's residence. It here consists of an almost perpendicular ore-body of decomposed schist, about three feet wide, within

which are numerous thin layers of quartz, frequently showing free gold. As the vein approaches water-level, however, it carries more or less pyrite, and increases in width. The limited prospect gives a very imperfect idea of its economic value. Further investigation is necessary, in order to reveal its character and extent.

The central vein is exposed in two small shafts, located on a steep hillside, a few hundred yards west of the east vein. It is about two feet wide; and it is formed mainly of quartz, which carries a good deal of pyrite. Several tons of ore, from these excavations, have been milled at the Georgiana mine; but we were unable, to obtain any satisfactory report of the results.

The west vein lies a short distance, still further, to the west, and a number of test-pits have been sunk upon it, at different points along its outcropping, on both the Poor and the adjoining properties to the southwest, now owned by Hugher, Evans and Kitchen. This vein is quite similar, in structure and appearance, to the east vein, though it is usually much wider, and contains no pyrite, so far.

A sample, taken, by the writer, from this property, gave the following results, in the Survey laboratory: —

Ore sample, William Poor's Property — .25 oz. (\$5.00) of gold per ton

THE GEORGIANA MINE

This mine is located, in the southwestern corner of Cherokee county, *on lot 958, 21st district*, three and a half miles northeast of Acworth. A number of auriferous veins have been located, on this property; and it has been more or less prospected, in the last few years. These veins occur, along the side of a ridge, near the head-

waters of Fox's creek, where they are found, to conform, in strike and dip, to the country-rock. The prospecting consists of several tunnels, and shafts, located, at various points, on the ridge. The main tunnel, four hundred feet in length, driven at right angles to the schists, cuts three different veins, which vary, from two to twenty-seven feet, in width. They consist principally of mica-schist, with but little quartz. The ore is all low-grade; and, thus far, it has not been milled with profit. A second tunnel, one hundred and forty feet long, exposes an eight inch vein, carrying ore, that is said to have yielded \$5 per ton.

The three principal shafts, all of which were inaccessible, at the time of our visit, attain a depth of ninety to one hundred and twenty feet. One of these cuts a quartz vein, from three to six feet wide, carrying gold, in paying quantities. From these various excavations, several tons of ore are reported to have been taken, from time to time, and milled, with satisfactory results. There is located, on the property, a well equipped Huntington mill, in good running condition having a capacity of from one-half to two tons per day, depending upon the hardness of the ore. It is operated, by a thirty-five horse-power engine, and is supplied with water, from one of the deepest shafts.

THE TRIPP PROPERTY

This property, *lot 959, 21st district*, lies directly east of the Georgiana mine, on the adjoining lot. It has had a limited amount of placer work, and also some vein prospecting. There is to be seen on this property, within a few yards of the Acworth road, a recent

shaft, thirty feet deep, exposing a very rich auriferous quartz vein, about twelve inches in thickness. The quartz is mostly of a reddish or brownish color, carrying more or less pyrite, and frequently having a somewhat laminated structure.

Some beautiful hand specimens of the ore were obtained from the shaft, showing free gold. The average assay value of the gold, as determined in our laboratory, runs from \$16 to \$17 per ton. This is a very encouraging prospect, and certainly warrants further investigation.

Below, is given the result of one of the assays, from a sample, taken, by the writer:—

Ore sample, Tripp Mine----- .79 oz. (\$15.80) of gold per ton

THE KITCHEN PROPERTY

The Kitchen property, which has recently attracted considerable attention, on account of the discovery, on it, of what has been reported to be a very rich auriferous vein, of great thickness, is located *on lots 823 and 834, 21st district*. Besides this large vein, there also occurs, here, many other gold-bearing quartz veins, varying in thickness, from a few inches to four feet; and all running parallel with the laminae of the schist. Some of these lesser veins have been exposed, at places, by open cuts, to the depth of a few feet; and they frequently show what appears to be a good quality of ore. These surface indications are quite encouraging; and they would seem to warrant further investigation. The so-called Kitchen Vein, the large vein, mentioned above, about which there has been, lately, much talk, occurs *on lot 823*, a short distance northwest of the Kitchen residence. It outcrops, here, along the

side, and near the top, of a low ridge, where it has been prospected, at a number of places, by open cuts, from two to eight feet in depth. The auriferous ore-body, which has been improperly called a fissure vein, consists of a zone or belt of garnetiferous mica-schist, interlaminated with innumerable layers of quartz, all dipping, at a high angle, to the southeast. Some of the quartz layers contain partially oxidized crystals of pyrite, arranged along definite lines, producing a banded structure, while other layers contain mica; and, when they are removed from their natural bedding, in thin layers, they are quite flexible. The ore-body, at this point, attains a thickness, of more than fifty feet; it appears to have originated from a metamorphism of thin beds of sandstone and highly siliceous layers of clays. This clastic origin of the ore-body seems to be quite evident, when we take into consideration its great length, together with its uniformity of character. It can be traced, with a considerable degree of certainty, from near Canton, in Cherokee county, to the Alabama line, near Tallapoosa. At many places, along its outcropping, it is found to be gold-bearing; especially is this true, on Burnt Hickory ridge, in Paulding county; and near the Hollins mine, in Haralson county. Specimens of the ore, taken from this ore-body on the Kitchen property, assayed from three to seven dollars and a half per ton. The high-grade ore contains numerous garnets, which are probably the source of much of the gold. The great size of the ore-body exposed here, although consisting of a low-grade ore, indicates that the deposit is valuable. Nevertheless, the property should be thoroughly prospected, before the erection of expensive machinery.

A sample, taken by the writer, assayed in the Survey laboratory, as follows: —

Ore sample, Kitchen Property --- .125 oz. (\$2.50) of gold per ton

A sample, taken at random, 12 feet below the surface of the large ore-body, by Prof. Yeates, State Geologist, consisting of semi-decomposed mica-schist, with interlaminated quartz, was assayed, in the Survey laboratory, with result, as follows:—

Ore sample, Kitchen Property --- .375 oz. (\$7.50) of gold per ton

THE STANSILL PROPERTY

This property is located, three miles east of Allatoona, *on lot 848, 20th district*, between the Georgiana and the Glade mines. It consists of two recent shafts, one ten and the other thirty-five feet, in depth. Each exposes an auriferous vein. In the latter, the vein attains a thickness of about ten feet, while that, in the former, has a width of less than ten inches. Both shafts are located on the bank of a small branch, scarcely a hundred yards apart. It seems quite probable from the strike and the general appearance of the ore-body that they are continuous; that is, outcroppings of the same vein. This, however, cannot be definitely demonstrated, until further prospecting has been done. The vein material, which is exposed, in the thirty-five foot shaft, is made up mainly of iron-stained quartz, with more or less pyrite and chalcopyrite. Some of the quartz is frequently porous, from the weathering of the pyrites; and, when broken, it shows numerous cavities, filled with iron oxide. There also occurs, another variety of quartz, which is of a dark color, compact, and difficult to crush. Moreover, there is to be seen, scattered irregularly through the ore-body, more or less pyritic hornblende-schist. Samples of the ore, taken from the deeper shaft, assay from \$2.00 to \$6.00 per ton; while small hand speci-

mens, taken from the other shaft, have been reported to run as high as \$5 8.00 per ton.

In strike and dip, the vein corresponds with the hornblende-schist, the country-rock.

CHAPTER XIV

BARTOW COUNTY

By S. W. McCallie, Assistant Geologist

Allatoona, on the Western & Atlantic R. R., in the southern portion of Bartow county, was the center of very active gold mining operations, thirty or forty years ago. Valuable placer-deposits were first discovered, and worked here, after which, attention was directed to vein-mining.

THE ALLATOONA VEIN

The Allatoona Vein, located *on lot 929, 21st district*, was extensively worked, from 1835 to 1840. It has been prospected, for fully half a mile, by sinking shafts, at short distances from each other, along its outcropping. At one point, the ore has been taken out, to the depth of forty feet (water-level), for two hundred yards along the vein, and milled. The mine is said, to have been quite profitable, as long as the oxidized portion of the vein was worked.

There probably exists, here, large bodies of paying ore ; but the greater part of it, now, likely lies below the water-level, where it occurs in the form of sulphides. All the excavations were inacces-

sible ; and the only direct knowledge of the vein was obtained from the examination of a few fragments of the ore, on the dump. It appears to be made up, of the usual iron-stained, laminated quartz, which was possibly separated, by thin layers of schist. It is said, that the vein varies, from one to four feet in thickness, and retains pretty much its same character, at the various openings. The strike, which corresponds to the schist, is N. 70° E.; while the dip is variable, though usually, at a high angle, to the southeast. The country-rock is mica- and hornblende-schist. It is so thoroughly decomposed, above the water-level, that the expense of operating it is comparatively small.

Other veins, of less importance, are reported to have been discovered on this property, though they seem never to have been prospected, to any extent ; and, consequently, but little is known of the character of the ore, which they contain.

The bottoms, along Allatoona creek, which traverses this property, and, also, the two adjoining lots, 930 and 944, are supposed to contain workable placer-deposits. These, however, seem never to have been thoroughly prospected, and therefore no reliable estimate can be placed on their value.

A small, intermittent stream, known as Gold Branch, which enters Allatoona creek, at the upper end of these bottoms, has been worked for gold, for nearly half a century. The placer is, probably, half a mile in length, with an average width, of a hundred feet. Much of this area has been worked over, many times. The early workings are reported, to have been remarkably profitable, and to have produced, in a short time, many thousand pennyweights of gold. It is said, that even now, after a hard, washing rain, it is no uncommon thing for small nuggets, weighing from one to five pennyweights, to be found in the bed of this stream. The nugget

form, and the roughened condition of gold, found along the streams, show, that it has originated, from the breaking down of an auriferous vein, near by.

A limited amount of superficial vein-prospecting has been done, at different points, along the adjacent hillsides ; but the mother-lode, which has supplied the placer, appears never to have been located.

THE GLADE MINE

The Glade Mine is situated on *lots 852, 878, 879, 924 etc., 21st district*, about two miles northwest of Allatoona. The work, which consists of vein prospecting, done several years ago, was found to be in a very unsatisfactory condition, for examination. The Adams shaft, fifty feet in depth, exposes a large white quartz vein, interstratified with hornblende- and mica-schist, frequently containing small seams and cavities, filled with calcite. There is a marked resemblance between the country-rock, found here, and that at the Creighton mine, in Cherokee county ; though there is quite a difference, in the appearance of the ore. That, of the latter, carries a high percentage of auriferous pyrite, while the ore from the former is almost entirely free from pyrite. A few yards from this shaft, and in the direction of the trend of the vein, is a small pit, about fifteen feet long and ten feet deep. From this excavation, it is reported, that a colored man, by the name of George Freeman, took out several hundred pennyweights of gold. The story, though somewhat exaggerated, is nevertheless credited, by some of the best citizens in the vicinity.

A short distance from the above excavation, on the same property, is another shaft, eighty feet deep, on what is called the Eastport Vein. This shaft exposes, it is said, a gold-bearing quartz vein, from two to three feet in thickness, which carries ore, milling \$10 per ton. Near by, is to be seen a partially filled pit, known as the Priest Hole. In this excavation, it is claimed, was discovered, several years ago, a very rich pocket, from which sixteen pounds of gold were obtained. The country-rock, at the various openings, consists of mica- and hornblende-schists, dipping, at a high angle, to the southeast.

W. M. GOINGS' PROPERTY

The Goings Property, *lot 808, 21st district*, situated two and one-half miles north of Allatoona, was prospected, some years ago, for gold, by Hoskins & Phillips. This firm is reported, to have discovered, on the property, a small auriferous quartz vein, assaying \$100 per ton. These old works, consisting of a few shallow shafts and pits, are now inaccessible ; yet, there is, near by, a recent shaft, fifteen feet deep, that exposes a twelve inch quartz vein, showing free gold. The vein, at the time of our visit, was not sufficiently exposed to give any definite knowledge of its economic value. However, the prospect was encouraging, and should stimulate further investigation.

THE AVERY MINE

This mine is located *on lot 947, 21st district*, near the road, leading from ~~Allatoona~~ to Canton. A gold-bearing vein, consisting of porous, iron-stained quartz nodules, ~~imbedded~~ in schist, occurs on this property, outcropping on the hillside. It has been worked, ~~for~~ several yards, at one point, by an open cut, and the ore, milled on a small stamp-mill, erected on a stream, at the base of the hill. The result of the mill-test was not learned. A few other pits are to be seen on the property ; but they are, now, more or less filled with earth.

THE ROBERTSON PROPERTY

W. C. Robertson's Property, *lot 1,097, 21st district*, which was prospected for gold, some six years ago, lies half a mile west of the Cherokee county-line. The work consists of four or five shafts, varying, in depth, from twenty to sixty feet. The excavations are said, to expose a quartz vein, carrying a good quality of gold ore. The shafts, at the time of our visit, were all inaccessible ; and no examination of the ore *in situ* was made. The material on the dump, however, shows, that the vein consists of a porous reddish-colored quartz, with mica-schist walling.

EISEMAN'S PROPERTY

On an adjoining lot, owned by B. A. Eiseman, are other similar excavations, exposing a gold-bearing vein, that is probably a continuation of the above. There is to be seen, on this property, near one of the shafts, a comparatively new five-stamp mill, in good running condition. It was erected here, about four years ago, and was run, for a short time, in making a mill-test of the ore, taken from the vein. The result of the test seems never to have been made public.

THE I. O. McDANIEL PROPERTY

This property, *lot 1,075, 21st district*, is situated near the Western & Atlantic R. R., one mile south of Allatoona. A gold-bearing vein was discovered, on this property, in 1888; and it has since been prospected, by a number of open cuts and small pits, for about two hundred yards, along its outcropping. The ore-body, where exposed in a cut at the base of the hill, has a width of ten feet. It consists of mica-schist, in which are imbedded numerous lens-shaped quartz nodules, of various sizes. The ore is of a low grade, averaging, probably, less than \$6 per ton.

JOHN J. HOWARD'S PROPERTY

The Howard Property, *lot 1,224, 21st district*, was prospected, to a limited extent, for gold, about five years ago. We found here, on a steep hillside, several open cuts, that expose a gold-bearing vein, from one to four feet in width. This ore-body is made up, principally, of mica-schist, in which occur numerous thin layers and lens-shaped nodules of iron-stained quartz. The quartz frequently shows free gold on the surfaces, that come in contact with the schist. The country-rock, in immediate contact with the vein, is mica-schist; while a few yards away, are hornblende-schists; all have a northeast and southwest strike, and dip 50° to the southeast.

CHAPTER XV

COBB COUNTY

By S. W. McCALLIE, ASSISTANT GEOLOGIST

THE PAYNE, KENDRICK, RANDALL AND HOUSE PROPERTIES

The eastern portion of the Carroll County Gold Belt extends through the northwestern corner of Cobb county. The principal works are located on the Payne, Kendrick, Randall and House properties, *lots 49, 50, 66 and 67, 20th district*, one and a half miles east of Acworth. Gold was discovered on these lots, more than eighty years ago, in the gravel, along the small streams, tributary to Proctor's creek. These early placer-workings, although covering only a comparatively small area, are said to have been quite profitable, and to have yielded, from time to time, several thousand pennyweights of fine gold. Numerous gravel heaps and pits, frequently overgrown, by trees of considerable size, are all, that now remain to mark the place of these former works. Several recent small test-pits are to be seen at different points along the streams ; but there appears to have been no regular placer-mining carried on, for a number of years.

It is thought, by some, that there still exists, here, workable deposits of auriferous gravel. This however, can only be definitely determined, after a thorough inspection of the alluvial deposits of

the various branches. A considerable amount of money and labor was expended, in vein-mining on the above, and, also, on the adjoining properties, prior to the late war. Numerous old shafts and tunnels are to be seen, on the ridges and hillsides, near the placers. Some of these are said, to have exposed rich gold-bearing quartz veins, from which many hundred tons of ore were milled.

All the excavations were inaccessible, with the exception of one, on the House property, where a white quartz vein, dipping with the schist, shows, in an open cut. It was found, practically impossible, to get any satisfactory idea of the various auriferous veins, occurring in this locality, from what could be seen in excavations, made thirty or forty years ago. There can be no doubt, about the existence of a number of gold-bearing veins on these properties ; yet, as no actual observations could be made, on account of the condition of the old works, nothing definite can be stated, concerning their general character or economic value.

THE HAMILTON MINE

The Hamilton Mine is located on *lot 11, 20th district*, a short distance from the Cherokee county-line. It was abandoned, several years ago ; and it was, therefore, found in no condition, for examination. There is to be seen, here, a number of old shafts, open cuts and tunnels ; also the remains of a furnace, used in smelting the ores.

In two or three of the shafts, quartz veins, from one to three feet in thickness, are exposed. These may, or may not be portions of the veins, formerly worked. They consist of a light-colored quartz,

which appears, to carry only a small amount of gold. Several tons of ore are said, to have been mined here, and treated, in the furnace, by a new process of separation. Whether or not the process, or the ore, was unsatisfactory, was not learned. However, the works were soon abandoned. About two miles east of the above mine, *on lot 15, 20th district*, known as the Cox Property, are other old works, long since abandoned, and now partially filled with earth.

J. B. KEMP'S PROPERTY

This property is located only a short distance south of the W. & A. R. R., *on lot 272, 20th district*. A considerable amount of prospecting has been done on the property, from time to time; but the excavations were, with few exceptions, found to be inaccessible. On this lot, are to be seen a number of open cuts and shallow pits. In one of these excavations, which is about twenty feet long and eight feet deep, is exposed a laminated quartz vein, about twelve inches in thickness. The vein conforms, in strike and dip, with the country-rock.

Samples, taken by the writer, yielded, upon assay, in the Survey laboratory, the following results: —

- No. 1. Ore sample, Kemp Property - .125 oz. (\$2.50) of gold per ton
- No. 2. Ore sample, Kemp Property - .250 oz. (\$5.00) of gold per ton
- No. 3. Ore sample, Kemp Property - .375 oz. (\$7.50) of gold per ton
- No. 4. Ore sample, Kemp Property - .350 oz. (\$7.00) of gold per ton

THE W. H. HADAWAY PROPERTY

This property, *lot 271, 20th district*, situated seven miles south of Acworth, near Lost Mountain, attracted considerable attention, a short time ago, on account of the discovery, of what was then thought to be a very rich gold-bearing vein. It has since been opened up; and it is now exposed, in several open cuts, to the depth of ten or fifteen feet. The vein material, which varies from two to four feet in thickness, consists of thoroughly decomposed mica-schist, with numerous thin layers of quartz. The latter frequently show free gold on their surfaces, where they come in contact with the schist. A number of pan-tests, made at the different openings, gave very satisfactory results. The dip of the vein, and, also, of the country-rock is to the southeast, at a high angle, while the strike is northeast and southwest.

More or less gold has been found along the small streams, in the vicinity; but the workable portion, of these placer-deposits, is now practically exhausted, so that the value of the properties depends largely upon the development of the auriferous veins.

Gold has been discovered, at various other places in this county; but the works are now all old, and in no condition to report upon.

CHAPTER XVI

PAULDING COUNTY

By S. W. McCallie, Assistant Geologist

The Dahlonega Gold Belt traverses the northwestern portion of Paulding county, where it has been extensively prospected on Burnt Hickory ridge, and in the vicinity of Yorkville. Through the southeastern part of the county, passes the Carroll County Belt, which has been worked, as placer, along the tributaries of Sweet-water creek. Burnt Hickory ridge is a low, broad ridge in the northern part of the county, separating the waters of Pumpkinvine and Raccoon creeks. The numerous small streams, which have their sources on either side of this ridge, in the vicinity of Huntsville, have been worked for gold. Some of these deposits were formerly valuable; but they are, now, practically exhausted.

THE SHEFFIELD AND HEIDT PROPERTY

This property, *lot 656, 3rd district*, situated on Burnt Hickory ridge, near Huntsville, attracted the attention of gold miners, as early as 1845. An auriferous vein was discovered, here, a short time previous to this date, near the source of a small stream, which

THE W. H. HADAWAY PROPERTY

This property, *lot 271, 20th district*, situated seven miles Acworth, near Lost Mountain, attracted considerable at short time ago, on account of the discovery, of what thought to be a very rich gold-bearing vein. It has since opened up; and it is now exposed, in several open cuts, to of ten or fifteen feet. The vein material, which varies from four feet in thickness, consists of thoroughly decomposed schist, with numerous thin layers of quartz. The latter frequently show free gold on their surfaces, where they come in contact with the schist. A number of pan-tests, made at the different places, gave very satisfactory results. The dip of the vein, and the country-rock is to the southeast, at a high angle, with a strike is northeast and southwest.

More or less gold has been found along the small stream in the vicinity; but the workable portion, of these placer-deposits, is practically exhausted, so that the value of the properties largely upon the development of the auriferous veins.

Gold has been discovered, at various other places in this county, but the works are now all old, and in no condition to re-open.



CHAPTER XVI

PAULDING COUNTY

By S. W. McALLIE, ASSISTANT GEOLOGIST

The Dahlonega Gold Belt traverses the northwestern portion of Paulding county, where it has been extensively prospected on Burnt Hickory ridge, and in the vicinity of Yorkville. Through the southeastern part of the county, passes the Carroll County Belt, which has been worked, as placer, along the tributaries of Sweet-water creek. Burnt Hickory ridge is a low, broad ridge in the northern part of the county, separating the waters of Pumpkinvine and Raccoon creeks. The numerous small streams, which have their sources on either side of this ridge, in the vicinity of Huntsville, have been worked for gold. Some of these deposits were formerly valuable; but they are, now, practically exhausted.

THE SHEFFIELD AND HEIDT PROPERTY

This property, lot 656, 3rd district, situated on Burnt Hickory ridge, near Huntsville, attracted the attention of gold miners, as early as 1845. An auriferous vein was discovered, here, a short time previous to this date, near the source of a small stream, which

(229)

Y

trict, Paulding county.

down on this prop-
at 100 feet from each

The country-rock,
erly strike, and dips
auriferous vein here
be quite rich in the
ccessible, this stated
ted near the center
ons warrant a more
han has, heretofore,

trict, adjoining the
of the work con-
deep. The work
ind to be so filled
re vein could be
aken from these
out \$20 per ton.
ws, that the ore
difficulty found,

in separating the gold, from these sulphide ores, is said, to have finally caused the abandonment of the property.

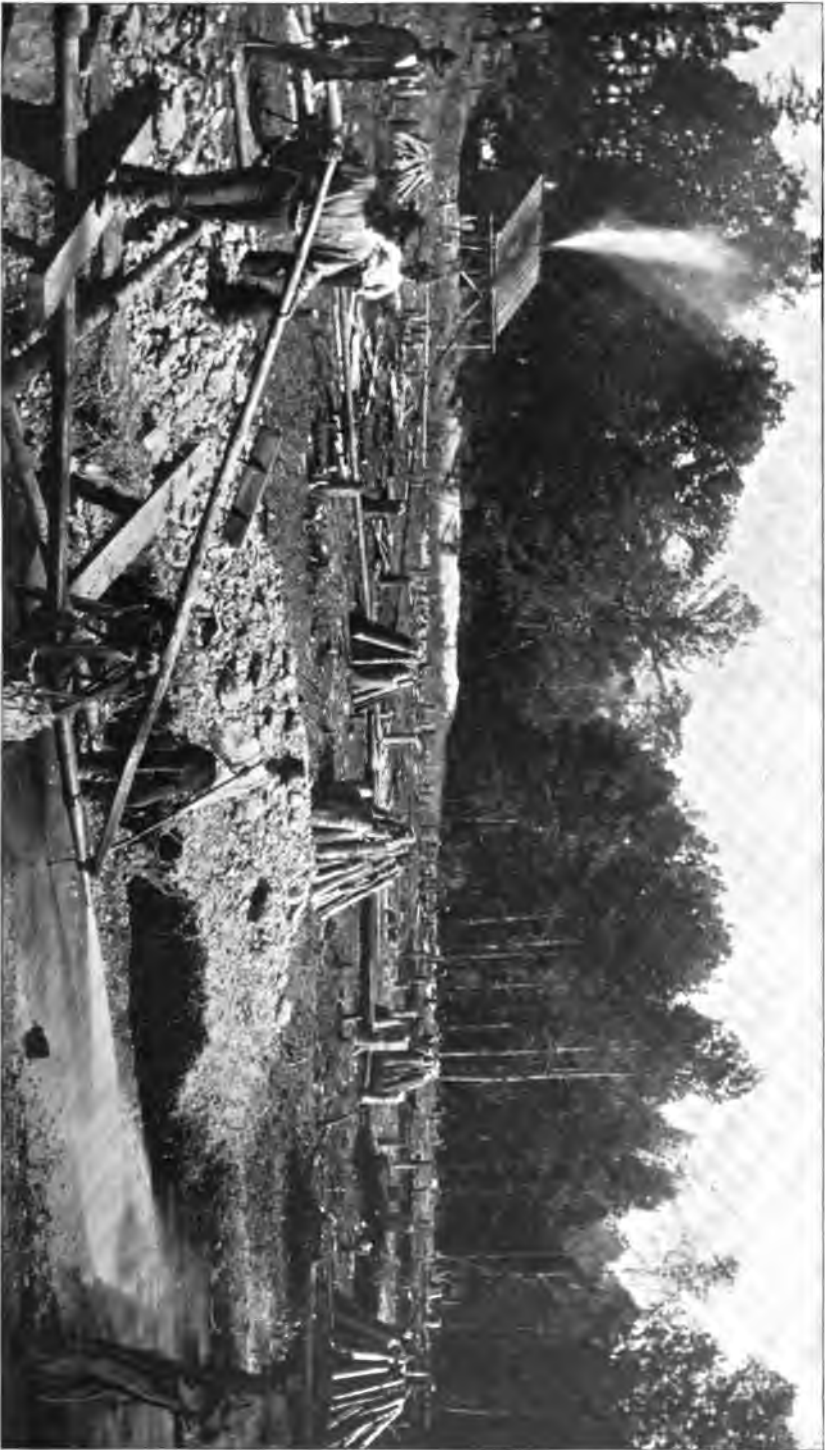
Similar prospecting shafts are to be seen, *on the adjoining properties, belonging to Quarles, Carlton, Anderson, Cochran and others.* There appears to be a number of auriferous veins, traversing this ridge, some of which are probably of economic importance; and they should be more thoroughly prospected.

THE DUNNAWAY PROPERTY

This property is situated on Burnt Hickory ridge, about three miles northwest of Huntsville, near the Cartersville road. It was prospected, about four years ago, by Alfred Johnson, who held a lease on the property. The work consists of four shafts, from twenty to sixty feet deep, and a tunnel, one hundred and fifty feet, in length. The tunnel cuts a number of gold-bearing veins, varying, from a few inches to six feet, in thickness. The vein is made up of mica-schist and thin layers of quartz, all more or less decomposed, and easily mined with a pick. The ore is of a low grade; yet, on account of its being found in large quantities, it can, probably, be worked with profit.

THE MICHIGAN GOLD MINING COMPANY'S PROPERTY

The Michigan Gold Mining Company began placer-mining in the fall of 1895, about two miles southwest of Huntsville, on a small



HYDRAULIC GIANT IN OPERATION, ON THE PLACER PROPERTY OF THE MICHIGAN GOLD MINING CO.,
NEAR HURLER HICKORY, PAULDING COUNTY, GEORGIA.



stream tributary to Raccoon creek. The Company owns, here, five lots of land, on which are supposed to be located, valuable placer-deposits.

At the time of our visit, a small hydraulic plant, consisting of a fifty horse-power boiler and a Gordon pump, furnishing seven hundred and fifty gallons of water, per minute, had just been erected, and a hydraulic giant, put in operation.¹ The work, however, had not progressed, sufficiently to give any satisfactory knowledge of the deposit.

A short distance above the location of the Company's plant, along the branch, the remains of old placer works, done many years ago, are to be seen. These works are, from a few feet to several yards, in width, and extend to within a short distance of the source of the stream, on the Sheffield and Hodges properties, about one mile above. The unworked area, in which the gold is supposed to occur, in paying quantities, extends over several acres, in the narrow bottom along the stream. The overburden varies, from two to four feet, in thickness.

THE MATHEWS PROPERTY

This property, *lot 108, 3rd district*, located about four miles north of McPherson, has had a considerable amount of placer-work done upon it, in the last few years. The entire placer covers only a few acres. It lies along a small stream, flowing into Raccoon creek. The most valuable part of the deposit has evidently been exhausted. However, there probably still exists, at various places along the

¹ See Plate XII.

stream, small areas, which may, even now, be worked with profit. No auriferous veins, of economic value, have, yet, been discovered, in the vicinity of the placer.

THE AUSTIN MINES

The Austin Mines are old placer-works, located *on lot 984, 2nd district*, seven miles southeast of Dallas. The works extend along a small stream, for nearly half a mile, having a width, in places, of fifty yards. The total amount of gold, taken from the deposit, has been estimated, at several thousand pennyweights. Some vein-prospecting has been done, at different places ; yet no discovery, of importance, seems to have been made.

DR. PARKER'S PROPERTY

On Dr. G. T. Parker's Property, *lot 410, 2nd district*, are similar placer-works, which were done more than fifty years ago. Gold has, also, been found, on a number of other lots in the district ; but, not in sufficient abundance, to pay for working.

THE YORKVILLE MINE

This mine is situated *on lot 331, 19th district*, about two and a half miles east of Yorkville. Gold was found, here, in a small stream, in 1855. The discovery was soon followed, by an examination of the bed of the stream, which resulted, in locating a valuable placer-deposit, extending along the branch, for a quarter of a mile. The deposit was worked, from time to time, for several years; and it produced much gold; but, it being finally exhausted, attention was directed to vein-mining. Gold-bearing veins were first discovered, on the hillside, at the upper end of the placer, in 1868. Soon afterwards, an eight-stamp mill was erected, on the property; and vein-mining was commenced, and successfully carried on, for about five years. During this time, some very rich ore-shoots were discovered, and, worked to water-level, where they had to be abandoned, on account of the operator's not having any satisfactory method, for treating the sulphide ores.

A short time ago, the property was purchased, by a Chicago-company, who, at once, commenced work, with a view to developing the mine, in a systematic way. At the time of our visit, the company had just completed a tunnel, of four hundred and sixty feet, along the strike of the vein, besides a number of cross-cuts, intersecting the laminæ, at right angles. It was learned, that it was the intention of the firm, to erect a large stamp-mill, chlorination-plant etc., on the property, at an early date, and to begin mining operations, on a large scale.

There are exposed, on the hillside, in the several excavations, three different auriferous veins, all running parallel, and dipping, with the country-rock, to the southeast. Two of the veins seem to

be a series of ore-shoots, rather than well defined continuous veins, while the other, which is, now, being worked, continues for some distance, with an average width of fifteen feet. The ore-bodies consist of a dark-colored mica-schist with quartz, more or less contorted, and impregnated with auriferous pyrite. The weathered surface of the vein is usually quite rough and iron-stained; and, frequently, it shows free gold.

THE BARTON PROPERTY

J. B. Barton's property, *lots 334 and 369, 19th district*, lying immediately southwest of the Yorkville mine, was worked, to some extent, for gold, as early as 1856; but the main part of the vein-prospecting was not done, until 1880.

The work consists of a number of shafts, twenty to sixty feet deep, three short tunnels, and an open cut, two hundred feet long and twenty feet deep. Several tons of ore were taken from these excavations, and milled, on a five stamp-mill, erected on a small stream, near by, yielding, it is said, \$12 of gold per ton.

Only two of the veins, which have been prospected, were exposed to view. They are from two to three feet wide, and consist of stringers of quartz, separated from each other, by thin layers of mica-schist, which frequently carry more gold than the quartz itself. The vein conforms, in strike and dip, to the country-rock. Similar prospecting has been done *on the Singleton, the Dinson and the McGarity properties, lots 366, 488, 694 and 979, in the same district.*

CHAPTER XVII

DOUGLAS COUNTY

By S. W. McCALLIE, ASSISTANT GEOLOGIST

The gold deposits of Carroll county continue, without interruption, into Douglas county, reaching its greatest development in the neighborhood of Pine Mountain, only a short distance from the county-line.

THE PINE MOUNTAIN PROPERTY

This property, *lot 206, 2nd district*, now owned by Miss Jennie Stone, is a round hill, locally known as Pine Mountain, rising about 200 feet above the surrounding valley. Along the slopes of this mountain, and extending well down into the valley, below, are to be seen extensive surface workings, which, many years ago, yielded a large quantity of gold. The works are now abandoned, and overgrown, by trees of considerable size. Several shafts, cuts and tunnels are to be seen along the hillside, now filled with earth. In one or two of these old excavations were noticed exposures of quartz veins, some of which attain considerable thickness; but the quartz is of a light color and carries but little, in value. The character of the vein differs, but slightly, from the auriferous veins in Carroll

county. The country-rock is made up of granite and gneisses. Associated with these veins, and frequently forming part of the walling, often occurs a greenish-colored mica.

Besides the above-named property, there are several other lots, owned by Miss Stone, in the immediate vicinity, which have been prospected, and worked for gold, from time to time. They all probably possess a mining value. However, they are, at present, undeveloped.

PROPERTY OF THE SOUTHERN STATES MINING AND EXPLORING COMPANY

This property consists of *lots 205 and 212, 2nd district*. The company is composed, chiefly, of English capitalists, who have been engaged, for the last two or three years, in prospecting the above named lots. The company has spent a considerable amount of money, in sinking shafts, driving tunnels and erecting machinery; but, for some reason, possibly bad management, the works have apparently met with only partial success. The principal part of the work has been done on *lot 212*, where four shafts, varying from 30 to 97 feet in depth, have been put down. There has also been erected, on this lot, a short distance from the main shaft, a 20-stamp mill, an assay office and a blacksmith shop, all of which are in first-class condition. The main shaft is supplied with a steam hoist and pump, operated by a small upright engine, located near by. The mill, which has a capacity of 35 tons of ore per day, has been operated, for only about three months. It is run by steam, and furnished with water, pumped from a small branch, at the foot

of the hill, some distance away. There are two drifts, with an aggregate length of about 200 feet, connecting the principal shafts, from which the greater part of the ore has been taken by overhead stoping. The shafts and the drifts, at the time of our visit, were inaccessible, and no knowledge, of the size of the ore-bodies, was obtained, from actual observation. The vein is said to be quite large, in places, attaining a thickness of 7 feet or more. The ore consists of slightly stained, light-colored, more or less granular quartz, with some mica scattered throughout the mass. The country-rock is granite, having, frequently, a gneissoid structure. There are numerous old workings on this property, which are reported to have produced, before the late war, much gold.

Lot 205 has had considerable work done on it, from time to time; but the various excavations were found to be in no condition, for examination. It adjoins the Pine Mountain lot, and is probably traversed by the same veins. The lot is considered, by many, to be excellent mining property. The few small outcroppings of veins, examined, certainly warrant a more thorough investigation of the property.

THE ASTINOL COMPANY'S PROPERTY

This property consists of *lots 204, 208 and 209, 2nd district*. The company has carried on the greater part of its work, *on lot 204*, where they have been prospecting for some months. They have driven several hundred feet of tunnels, with a view to cutting the rich ore-bodies, formerly worked on this property; but, at the time of the writer's visit, they had not succeeded. Only a few aurifer-

and small veins that been found, and they were either too small, or not low enough to be of economic importance. The prospecting is still being carried on, with the hope of striking, in the future, paying ore-bodies. The ore exposed in the veins, cut by the various dikes, consists of iron-stained, granular quartz and white, milky quartz. The latter usually occurs, in large pockets, and often shows free gold. The country-rock is granite and gneiss, usually highly decomposed, many feet below the surface.

THE TERRY'S REACH PROPERTY

This property is now being prospected, with encouragement from the State and District.

THE T. DURGUY PROPERTY

This property is located in the *Red Hill* district, which is now being prospected. The area, commonly known as the gold mine, is generally spoken of, as the Red Hill, a local name given to the redness of the soil, which results from the underlying hornblende-gneiss and schist. The property has attracted the attention of men interested in minerals, and only since it has come into the possession of Mr. T. Durguy, has any real systematic prospecting been attempted on the property. The principal part of the work, done

by Mr. Durgy consists of five shafts, varying, in depth, from 30 to 150 feet, and a few small cross-cuts. The excavation exposes a highly pyritic auriferous vein, carrying a considerable amount of hornblende, tourmaline, feldspar, calcite and other accessory minerals. The ore from this vein, which, in places, attains several feet, in thickness, is said to assay, on an average, about \$9.00 of gold per ton, besides yielding a considerable percentage of copper. The country-rock consists of a garnetiferous hornblende-schist and a mica-schist, having the usual northeast and southwest strike and southeastern dip. The works are supplied with a suitable engine, for hoisting and pumping purposes; but, at the time of our visit, the entire prospecting-plant was completely dismantled, a result of a recent premature explosion of dynamite. On this account, no examination was made of the ore in sight.

JOHN BAGGETT'S PROPERTY

This prospect is located near the Southern Railway, about one mile northeast of Winston. It is a recent prospect, consisting of two small open cuts, exposing a large mass of thin quartz veins, interlaminated with garnetiferous schists. The quartz is iron-stained, and carries considerable pyrite, which is said to be gold-bearing.

CHAPTER XVIII

CARROLL COUNTY

BY S. W. MCCALLIE, ASSISTANT GEOLOGIST

Only in two localities, in Carroll county, has gold been found, in sufficient abundance, to be of economic importance. The more noted of these localities, lies in the Villa Rica region, in the extreme northern part of the county. Gold was discovered, here, near Pine Mountain, in 1830. Two years afterward, several hundred hands were regularly employed, in the mines, and produced, annually, for a number of years, more than twenty-five thousand penny-weights of gold. The entire output of the mine has been estimated, by W. B. Candler, who has been living at Villa Rica, for many years, at \$500,000.

The early workings, which consist both of placer- and surface-mining, were confined, chiefly, to the narrow bottoms, along the small streams, and the adjacent hill-slopes. The area, over which gold has been found, in paying quantities, is limited to a narrow belt, not over six miles, in length, and less than two miles wide.

The topography of the region shows an advanced stage of denudation. The numerous small streams are usually sluggish, while the surface, though occasionally broken, by low ridges and hills, has the general appearance of a plain. With the exception of the so-called Pine Mountain, a small hill, near the center of the mining area, none of the ridges or elevations attain a height, of more than

seventy-five feet, above the surface of the streams. These topographical conditions have seriously interfered, in places, with surface-mining, owing to the difficulty, of conveying the water to the deposits, located on the hillsides. In most cases, this difficulty, however, has been met, and overcome, by the use of engines, in elevating the water to the desired point; or, by hauling the earth, containing gold, to the nearest stream.

The rocks of this area are quite different, from any, hitherto examined. In immediate contact with the vein, the rock consists mainly of granite, which is usually much fissured, and occasionally, to such considerable depths, that the expense of mining the ore is reduced to a minimum. Associated with the granite, occur schists and other metamorphic rocks, consisting of masses of hornblende and of magnesian silicates, such as serpentine, talc etc.

The gold-bearing veins are numerous; but, only a few, so far, have been worked, with profit. They vary, from a few inches to many feet in thickness, and consist mainly of quartz, which usually appears to have been crushed and broken, by some movement of the rock-mass. These veins often expand into pockets, carrying many tons of high-grade ore. Instances are given, where several hundred pennyweights of gold have been taken, from one pocket, alone.

The vein-mining consists of open cuts, extending along the outcropping of the veins. Some of these excavations are many rods long, and from ten to thirty feet deep, the earth or decomposed granite having been removed by hand. The principal part of the works, as well as the most favorable prospects, for further development, are located on *lots 155, 165, 166, 192, 193, 194 and 195, 3rd district.*

THE CLOPTON PROPERTY

During the writer's examination of the locality, only one property, in the vicinity of Villa Rica, was being prospected. This is known as the Clopton property, located on *lot 194, 3rd district*. The property was, then, in the hands of a Boston company, who had recently made a number of open cuts, shafts and tunnels, along the outcropping of the vein; and had just completed the erection of a mill of recent patent, which was at that time, being perfected and put in running order. As the President of the Company had instructed the Manager of the works, not to give any information, whatever, concerning the value of the ore, or the process of extracting the gold, nothing was learned about the property, which would be of interest to the general public.

THE HART MINE

This mine, *lot 165, 2nd district*, was worked, more or less extensively, several years ago; and it has produced a considerable amount of gold. The principal part of the works, on the property, consists of an open cut, 75 yards long, about 20 feet deep and several rods wide. Some two years ago, work was renewed on the property, a shaft was sunk on a vein to the depth of 35 feet, and the ore was taken out, and milled; but, for some reason, the work was again soon abandoned. There is, now, to be seen in the open cut, penetrating the decomposed granite, a quartz vein, about 18 inches in

thickness. The quartz is of a light gray color, and carries, at the point exposed, only a small amount of gold. Whether the vein, exposed, is a part of the main ore-body, or only an off-shoot from it, could not be definitely determined. Unfortunately, the prospects on this property, as well as on the above named lots, were found in no condition for examination. There can be no question, about there being valuable gold properties in the vicinity of Villa Rica. However, they must be put in a better condition, for inspection, before any trustworthy report can be made. Not one of the various lots, examined, was sufficiently prospected, to throw any definite light, on the character or value of the ore-bodies. The works are generally old and well filled with earth, or flooded with water.

THE BONNER MINE

The Bonner Mine is situated *on lots 94 and 99, 11th district*, seven miles southwest of Carrollton. The first discovery of gold was made, here, about 1840, in a number of small streams, flowing into Buffalo creek. Immediately afterwards, placer-mining began, and continued, with slight interruptions, until the breaking out of the civil war. During this time, it is estimated, that the mine produced more, than half a million dollars of gold. Not only the beds and bottoms, along the streams, were found to be rich, in gold; but the adjacent hillsides and dry hollows, also, contained valuable deposits. These were worked by means of rockers and long-toms, paying each hand, from two to twenty pennyweights per day.

After the war, mining operations were resumed; but, as the most valuable part of the placer was, now, either exhausted, or expensive

ous quartz veins had been found, and they were either too small, or ran too low in gold, to be of economic importance. The prospecting is still being carried on, with the hope of striking, in the future, paying ore-bodies. The ore exposed in the veins, cut by the various tunnels, consists of iron-stained, granular quartz and white, milky quartz. The latter usually occurs, in large pockets, and often shows free gold. The country-rock is granite and gneiss, usually highly decomposed, many feet below the surface.

THE THOMAS ROACH PROPERTY

This property, which is, at present, being prospected, with encouraging results, is *lot 213, 2nd district*.

THE T. DURGY PROPERTY

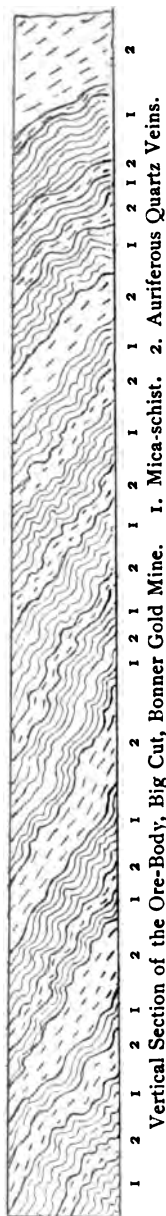
This property, *lot 239, 2nd district*, which is now being prospected by Mr. Durgy, lies without the area, commonly known as the gold belt, but within what is generally spoken of, as the Red Hill, a local name, so called from the redness of the soil, which results from the weathering of the underlying hornblende-gneiss and schist. The lot has attracted the attention of men interested in minerals, for some years; but, only since it has come into the possession of its present owner, has any real systematic prospecting been attempted, on the property. The principal part of the work, done

by Mr. Durgy consists of five shafts, varying, in depth, from 30 to 150 feet, and a few small cross-cuts. The excavation exposes a highly pyritic auriferous vein, carrying a considerable amount of hornblende, tourmaline, feldspar, calcite and other accessory minerals. The ore from this vein, which, in places, attains several feet, in thickness, is said to assay, on an average, about \$9.00 of gold per ton, besides yielding a considerable percentage of copper. The country-rock consists of a garnetiferous hornblende-schist and a mica-schist, having the usual northeast and southwest strike and southeastern dip. The works are supplied with a suitable engine, for hoisting and pumping purposes; but, at the time of our visit, the entire prospecting-plant was completely dismantled, a result of a recent premature explosion of dynamite. On this account, no examination was made of the ore in sight.

JOHN BAGGETT'S PROPERTY

This prospect is located near the Southern Railway, about one mile northeast of Winston. It is a recent prospect, consisting of two small open cuts, exposing a large mass of thin quartz veins, interlaminated with garnetiferous schists. The quartz is iron-stained, and carries considerable pyrite, which is said to be gold-bearing.

Fig. 18



to work, on account of the thickness of the overburden, and the scarcity of water, attention was turned mainly to vein-mining. This class of mining was found to be less remunerative, than the former; nevertheless, it was continued, for several years, with profit.

The auriferous deposits of this property are to be found, on a ridge, having an elevation of about one hundred and fifty feet, above the level of Buffalo creek, which flows, at the base of its northern slope. This slope, forming the source of a number of tributary heads of the creek, is, consequently, broken, by narrow ravines and intervening ridges. The former are known to carry much gold; and they have been more or less extensively worked. The total area of the deposits, that have been worked, cover about fifty acres. A number of auriferous veins, similar in character, occur along this slope, following the trend of the ridge, or, rather, the strike of its formation, which is, practically, its trend. These veins have been prospected, for nearly two miles, by shafts and open cuts; and they may be described as ore-bodies, consisting of a great number of small quartz stringers, separated by thin layers of mica-schist. The quartz and the schist are, frequently, many times repeated, forming, in places, ore-bodies, from twenty to forty feet, in thickness. These auriferous zones dip with the schist, the country-rock, at an angle of about 20° , to the

northeast; and they are, frequently, intersected, by small pegmatite dikes (?), which are now thoroughly decomposed, and form a mass of impure kaolin.

The general character of the ore-body can be studied best, by what is known as "Big Cut," near the Bonner residence. The latter excavation is about three hundred and fifty feet long, and twenty feet deep; and, from this many hundred tons of ore have been mined. There can be seen, here, numerous quartz stringers, running practically parallel with each other, separated by thin layers of schist. A shaft sunk, here, to the depth of sixty feet, shows but little change in the formation. Not only the quartz, but also the schists carry more or less gold, to this depth. Furthermore, the Bradley shaft, a quarter of a mile west of this, and the Tuttle shaft, about the same distance, east, show, that the ore-body retains pretty much the same character, for a considerable distance.

There can be no doubt of the occurrence on this property, of an almost inexhaustible amount of low grade ore, having an assay value of from \$1 to \$5 per ton. Besides the vein material, there are nearly a hundred acres of bottom, on Buffalo creek, which will, probably, pay for working, as placer. The undeveloped condition of the property seems to be due to two causes: — First, a lack of capital, on the part of the owners, for erecting suitable machinery, for working the ore; and, second, the high price, placed by them, on the property, making it an undesirable investment for capitalists.

Samples for assay were taken by the writer, from the Bonner mine, which, in the laboratory of the Survey, gave the following results: —

No. 1. Ore sample, Big Cut, Bonner

Mine..... .05 oz. (\$1.00) of gold per ton

- No. 2. Ore sample from the same
Cut ----- .05 oz. (\$1.00) of gold per ton
- No. 3. Ore sample, Bradley Pit,
Bonner Mine ----- .05 oz. (\$1.00) of gold per ton
- No. 4. Ore sample, from the same
Pit ----- .05 oz. (\$1.00) of gold per ton
- No. 5. Ore sample, Tuttle Shaft,
Bonner Mine ----- .125 oz. (\$2.50) of gold per ton
- No. 6. Ore sample, from the same
shaft ----- .250 oz. (\$5.00) of gold per ton
- No. 7. Ore sample, Bonner Mine-- .14 oz. (\$2.80) of gold per ton

Several lots, lying south of the Bonner property, in the same district, have also been prospected for gold; but the ore appears to be of a low grade; and only a few tons have been milled.

THE STACY MINE

This mine, now owned by T. F. Maddox, of Atlanta, is located on Oak Mountain, about four miles east of Carrollton. An auriferous vein, three feet wide, was discovered here, about 1878. Soon afterwards, a five-stamp mill was erected on the property; and mining operations began; but the works were finally abandoned, on account of the difficulty, in separating the gold from the ore.



THE ROYAL GOLD MINE AND MILL, NEAR TALLAPOOSA, HARALSON COUNTY, GEORGIA, SHOWING INCLINED AND ELEVATED RAILROAD,
USED FOR CONVEYING ORE FROM MINE TO MILL.



CHAPTER XIX

HARALSON COUNTY

BY S. W. MCCALLIE, ASSISTANT GEOLOGIST

Gold has been discovered in small quantities, on several different lots, in Haralson county; but only at a few places has it proved of economic value.

THE DEAN PROPERTY

On the Dean property, *lot 23, 7th district*, are to be seen the remains of old placer-works, from which, it is said, five hundred pennyweights of gold were taken, about fifty years ago. The works are located along a small stream, where they cover less than an acre.

THE McBRAYER PROPERTY

Near by, on McBrayer's property, *lots 1,207 and 1,230, 20th district*, are other small placer-works; also, on these, a limited amount of vein-prospecting was done, a short time ago, by Mr. Singleton, who then held an option on the property.

J. W. THOMASON'S PROPERTY

This property, *lot 127, 7th district*, as well as *some of the adjoining lots*, has been worked on a small scale, from time to time, for their placer-deposits. The aggregate area of the entire works, in the vicinity, covers only a few acres, and is confined, principally, to the beds of small streams, flowing into Beach creek. All attempts to locate the auriferous veins, that have supplied these deposits, seem to have been, so far, unsuccessful.

THE HOLLINS MINE¹

This mine is situated near Walker's creek, *lot 134, 8th district*, three miles west of Tallapoosa. Gold was discovered here, in the early forties, by William Owens, the original owner of the property. The manner of its discovery is quite interesting. While washing a pan of potatoes, taken from a patch, near the present stamp-mill, bright specks of gold were noticed, in the dirt. Investigation of the potato-field substantiated the hope, thus raised, and resulted in the discovery of a rich surface-deposit. Owens soon began mining operations, which he successfully continued for several years. During this time he erected a twelve-stamp mill on Walker creek, and did considerable vein-mining, as well as surface-work. The property was, afterward, sold to E. W. Hollins, who operated the mine, with profit, until the breaking out of the civil war.

Immediately after the war, Windom & King worked the mine,

¹ Since this report was written, this property has been purchased by the Royal Gold Mining Co., of which Mr. C. E. James, of Chattanooga, Tenn., is President, and Mr. Franklin Harris, also of Chattanooga, is Secretary. The mine, which is now called the Royal Mine, has been thoroughly equipped with a chlorination-plant, etc., and is said to be having much success — W. S. Y.

for about three years. This firm erected, on the property, a ten-stamp steam mill, together with the necessary pumping machinery, to rid the mine of water. Nothing seems, now, to have been done, at the mine, until 1886, when John Cross leased the property, for a term of ten years, with the privilege of buying it, for the sum of \$20,000. At the expiration of three months, Cross was successful, in selling the property to the Camille Gold Mining Company, for \$50,000. The new firm spent several thousand dollars, in erecting the present well-equipped mining-plant; but they operated the mine only for about two years. Since then a St. Louis company, and, also, French & Fisher, of the old Franklin mine, made some mill-tests of the ore; but no regular mining has been attempted.

The main part of the old works consists of an open cut, about two hundred yards long, one hundred and fifty feet wide, and fifteen feet deep, extending along the outcroppings of the vein. It is claimed that more than one hundred thousand pennyweights of gold have been taken, from this excavation, alone. The more recent work consists of two shafts, located within a few rods of each other. Both have been driven along the slope of the vein — one, to the depth of one hundred and eighty-six feet, and the other, to the depth of one hundred and fifty feet. The former, known as Shaft No. 2, has three different drifts, extending, at different levels, along the strike of the vein, in either direction. The first occurs at a seventy-five-foot level, and runs, east, one hundred feet, the second strikes in, at a level of one hundred and four feet, and extends, east, forty feet; and the third, at the bottom of the shaft, drifts, west, fifty feet. The latter, known as Shaft No. 1, has two drifts — one, at the seventy-five-foot level, extending, west, one hundred and twenty-eight feet; and the other, uniting the two shafts. Many tons of ore were taken, from these shafts, and milled;

but it is said to have been impossible to save the gold, on account of the abundance of sulphides.

The ore-body is made up of schists and quartz stringers, forming a zone, from fifteen to thirty feet wide, dipping with the country-rock, at a high angle, to the southeast. As the excavations were inaccessible, no specimens were secured for assay. There is, now, on the property, in a good state of preservation, an excellent gold-mining plant, consisting of the following machinery, buildings etc.:—

One Twenty-stamp Mill with 950 lb. Stamps,

Eight Frue Vanners,

One Blake Rock-crusher, 15 x 19 ins.,

Four Automatic Feeders,

One 150 horse-power Corliss Engine,

One 50 horse-power Double-headed Engine,

Two 80 horse-power Boilers,

One Rand Air-compressor, running 24 drills,

Two 2 in. Hooker Pumps,

One Knowles Pump, 2 in. discharge,

One Dean Pump, 2 in. discharge,

One Heater for Boilers,

Four Ingersoll Drilling-machines,

Seven Cottages for Laborers,

One Commissary,

One Blacksmith Shop,

One Superintendent's Residence,

One Assay Office and Fixtures,

One Three-story Mill-house.

OTHER PROPERTIES

In the vicinity of the Hollins mine, are several lots, which have been prospected for gold. The lots, that have attracted the most attention, are 47, 87, 99, 135 and 145, 8th district. All these have had a limited amount of work done on them ; but it has generally been, of such a superficial character, as to give a very imperfect idea, of the economic importance of the veins, prospected. The surface indications, in places, are quite favorable, and seem to warrant further investigation. The same layers of dark-colored laminated quartz (quartzite), which are so characteristic of the gold belt, along Burnt Hickory ridge occur, also, here; and, in places, they are said to carry gold. The geological formations, in the vicinity, consist, mainly, of mica-schist ; but there also occur, considerable quantities of hornblende-schist and black slate. The latter is well exposed, in a railroad cut, *on lot 145*, where it contains much iron-stained quartz, that probably carries gold, in small quantities.

CHAPTER XX

GILMER COUNTY

BY S. W. MCCALLIE, ASSISTANT GEOLOGIST

THE WHITE PATH MINE

The most noted gold mine in Gilmer county is the White Path Mine, located near the Marietta & North Georgia R. R.,¹ six miles northeast of Ellijay, *on lots 253 and 288, 7th district, and lot 271, 10th district*. This placer was discovered, in the early forties, by W. J. Holt; and it has, since, been worked almost continuously, producing, it is claimed, from its earliest workings to the present, more than one hundred thousand pennyweights of gold. The old miners tell, what now seem to be almost fabulous stories, about the richness of certain localities, now known as Austin Bluff, Spriggs' Hollow, etc. These stories, although doubtless exaggerated, nevertheless, evidently contain much truth, as they come from various sources, and, frequently, from men, whose veracity, on other points, would not be questioned.

The gold is usually coarse and water-worn. Many nuggets, weighing from one to seven hundred pennyweights, have been found. It occurs in the gravel, along the small streams, that lead down from the high mountains, lying a short distance to the east; and it is found, not only in the beds of the streams and in the adjacent bottoms; but also on the bluffs, sixty or seventy feet high

¹ Now the Atlanta, Knoxville & Northern R. R.

The total area of the works does not exceed fifty acres. Much of it, however, has been worked over, many times, with profit.

The bed-rock is overlaid with earth and gravel, from two to six feet in depth. The overburden, in most cases, has been removed.

Fig. 19

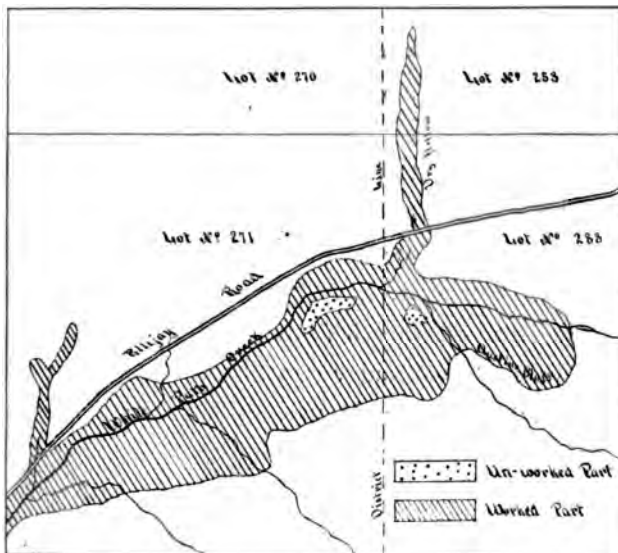


Diagram Showing the Present Condition of the White Path Placer Mine, Gilmer County, Georgia.

by hand, and washed in sluice-boxes and rockers, and the gold collected, without the use of mercury. Much of the fine gold, by this process, must have been carried away with the tailings. This may still be reclaimed, if a more economical mode of working should be adopted. It seems likely, that the remaining unworked area of the placer, which is profitable, is quite limited. Yet; the finding of a valuable deposit, a few years ago, in the construction of the Mari-

etta & North Georgia R. R., shows that the placer, although known and worked, for more than half a century, has not, yet, been thoroughly prospected. Much time, and a considerable amount of money, has been spent, from time to time, in trying to locate the source of the gold, which has supplied the placer; but, so far, all efforts have been unsuccessful; not even a trace of a vein seems to have been discovered. The nugget character of the gold, together with the pocket-like form of the quartz, in the vicinity, indicates, that the gold, probably, never existed in well defined, continuous veins, but in pockets or shoots, which have been cut away, by the action of the running water, and their auriferous contents, distributed among the water-worn gravel, along the streams below.

The geological formations of the locality consist of mica-schists, slate, gneisses and marble, having a prevailing southeastern dip. The former is frequently much folded and fractured, and contains many quartz veins, of limited extent, running either parallel with the strata, or cutting them, at various angles. These veins are often expanded into large pockets, which evidently become contracted, again, into mere stringers, or disappear entirely.

The water-worn quartz boulders, found along the streams, are commonly of a dark color, and occasionally quite massive, weighing many tons. Associated with the mica-schist, in places, are considerable deposits of limonite. This is especially true, of what is known as the "Dry Hollow," where many valuable nuggets have been found.

The water supply at the mines, at present, is limited; but, if necessity should demand, Turnip Town creek could be utilized, which, would furnish ample water, with sufficient fall, for all necessary purposes. A mining company, a few years ago, attempted to supply this mine, and, also, the mine on the adjoining property, with

water from this source; but, after spending several thousand dollars, and becoming financially embarrassed, the project was finally abandoned.

The number of miners, employed at the White Path mine, is quite variable. At the time of our visit, last summer,¹ which is the most favorable season, for mining, only about half a dozen were at work. The miner secures the right of mining, from the owner of the property, by paying a certain percentage of the gold, for the privilege, which leaves him, on an average, not over half a penny-weight per day, for his labor.

The system of mining, as carried on here, consists of removing the earth and gravel from its natural bed, by means of pick and shovel, and washing it, in sluice-boxes,² where the gold is caught on riffles, without the aid of mercury.

THE HOLT PROPERTY

This property, which lies immediately south of the White Path mine, has been worked, as a placer, to a limited extent, along Little Turnip Town creek. The gold, found here, is usually coarse, and resembles very closely that, found on the adjoining property. It occurs in a narrow gorge, which has been cut through the hill, by the rapidly flowing stream, and also in a wide expanse of bottom, below, at the junction of Big and Little Turnip Town creeks. A considerable amount of money was expended, a few years ago, in

¹ Summer of 1895.

² See Plate I.

constructing a long ditch, and making other necessary preparations, to put in a hydraulic plant, for working this bottom; but the work was never completed. It is questionable, whether the bottom really contains a sufficient amount of gold to justify the necessary destruction of its valuable farming land.

THE WHITAKER PROPERTY

This property, *lot 236, 10th district*, is located about two miles due west of the White Path mine. Gold occurs here, in a small placer, that is said to have produced, from time to time, several hundred pennyweights. The works, which cover an area of less than an acre, are located along a small stream, in the upper end of a narrow valley, shut in by steep hills, on either side, and extending back to the Ellijay river, about half a mile below. The gravel, overlying the bed-rock throughout the entire valley, contains more or less gold; and, if the statements, concerning the richness of the deposits, can be relied on, there can be no question, but that there still remains, here, a number of acres, that could be worked with profit.

The overburden varies, from two to eight feet, in thickness. The branch, on which the deposit is located, is small, although it furnishes sufficient water, throughout the greater part of the year, for sluice-washing. The source of the gold is not known. However, its roughened exterior indicates, that it originated, from the breaking down of auriferous quartz veins, near by.

Two or three small quartz veins, containing a considerable amount of pyrite, were seen outcropping along the north hillside. Those veins, although they do not carry free gold, that can be detected

by the unaided eye, are probably auriferous. At any rate, their general appearance, together with their close proximity to the placer deposit, would seem to warrant such a conclusion.

THE TURKEY PEN MINE

This is a small surface-working, covering only a fraction of an acre, on *lot 145, 7th district*. Gold occurs, here, in the residual earth, on a gradually sloping hillside; also in the narrow hollow below. The surface, in places, is said to have been quite rich, and to have paid well for working; although it had to be carried some distance, in order to obtain water for washing. On the hillside, above the surface workings, some prospecting, consisting of an open cut and a short tunnel, has been done; but the auriferous vein, which supplied the gold, seems not to have been located. The rocks, exposed in the cut, are mica-schist and hornblende-gneiss, the latter being, probably, an intrusive mass or dike. They have their usual southeastern dip, and are cut at various angles, by small, white quartz veins.

THE CARTICAY MINE

This mine, consisting of both placer and vein working, is located on the right bank of Carticay river, on *lot 139, 6th district*, about six miles east of Ellijay. The greater part of the placer-workings,

which cover a number of acres, was done so many years ago, that the area is now overgrown, in places, by trees of considerable size. The early returns are said to have been quite profitable, and to have yielded many pennyweights of fine gold. Only a few nuggets, the largest valued at twenty-five dollars, are reported to have been found.

The source of the placer gold appears to be an auriferous quartz vein, cutting the mica-schist and granite, at the upper end of the placer. One of these veins, discovered a few years ago, was thought, at the time, to be a very important find. Subsequent developments, however, proved its wealth, as far as developed, to be in a mere pocket of small dimensions, that was soon exhausted. A tunnel was afterwards driven, along the strike of the vein, for about fifty feet; and a number of tons of ore were taken out, and milled on a small ten-stamp testing-mill, erected near by; but no reliable information could be ascertained, concerning the result of the test. At the time of our visit, the pit, where the rich pocket was struck, and also the tunnel, leading off from it, was so filled with water, that it was found impossible, either to examine the vein, or to obtain specimens of the ore. The extent of the prospecting has been quite limited, and of such a superficial character, as to give no correct idea of the value of the ore-body. In order to obtain reliable information, concerning the gold-bearing veins on this property, there must be a further outlay of money, in sinking shafts and driving tunnels, at lower levels.

The country-rock, consisting mainly of mica-schist, is much folded and broken, and is impregnated, in places, by large veins of coarse-grained granite (pegmatite), which were injected, while yet in a plastic state, into their present position, during the folding and breaking of the country-rock. The gold-bearing vein appears, to be intimately

associated with the pegmatite, if not enclosed, entirely, within it. Further observations, however, are necessary, in order to verify the latter suggestion. The paying portion of the placer is now supposed to be practically exhausted; and, consequently, the value of the property must depend, chiefly, on the character of the auriferous vein, yet to be located. The water supply, for mining purposes, is abundant. Both the river and a small stream, running through the upper end of the placer, could be utilized, if necessary. The latter has considerable fall, and has been used, to some extent, in hydraulic mining.

A limited amount of placer-mining has been done, in the same district, on *the Reese, the Johnson and the Smith properties*; but they have now ceased to produce gold, in paying quantities.

CHAPTER XXI

FANNIN COUNTY

By S. W. McCALLIE, ASSISTANT GEOLOGIST

The only locality, where gold has been found, of economic importance, in Fannin county, is *in the 7th district, on lots 285, 321 and 322*. Gold was discovered, here, in the gravel deposits of Noontootly creek and its tributaries, prior to the late war. The deposits have since been worked, from time to time, yielding, it is claimed, many thousand pennyweights of gold. The entire area of the works covers only a few acres. Much of the creek bottom, which, in places, is more than a hundred yards, in width, seems never to have been thoroughly prospected. It is quite likely, that there still remains, here, valuable, unworked gravel-beds. This, however, can be easily determined, to a considerable degree of certainty, by judiciously sinking a number of inexpensive test-pits, at various points, in the creek-bottom. The earth and gravel, overlying the bed-rock, varies from two to six feet, in thickness. The abundance of water, together with sufficient fall for hydraulicking, reduces the expense of placer-mining, here, to a minimum.

LOT 321, 7TH DISTRICT

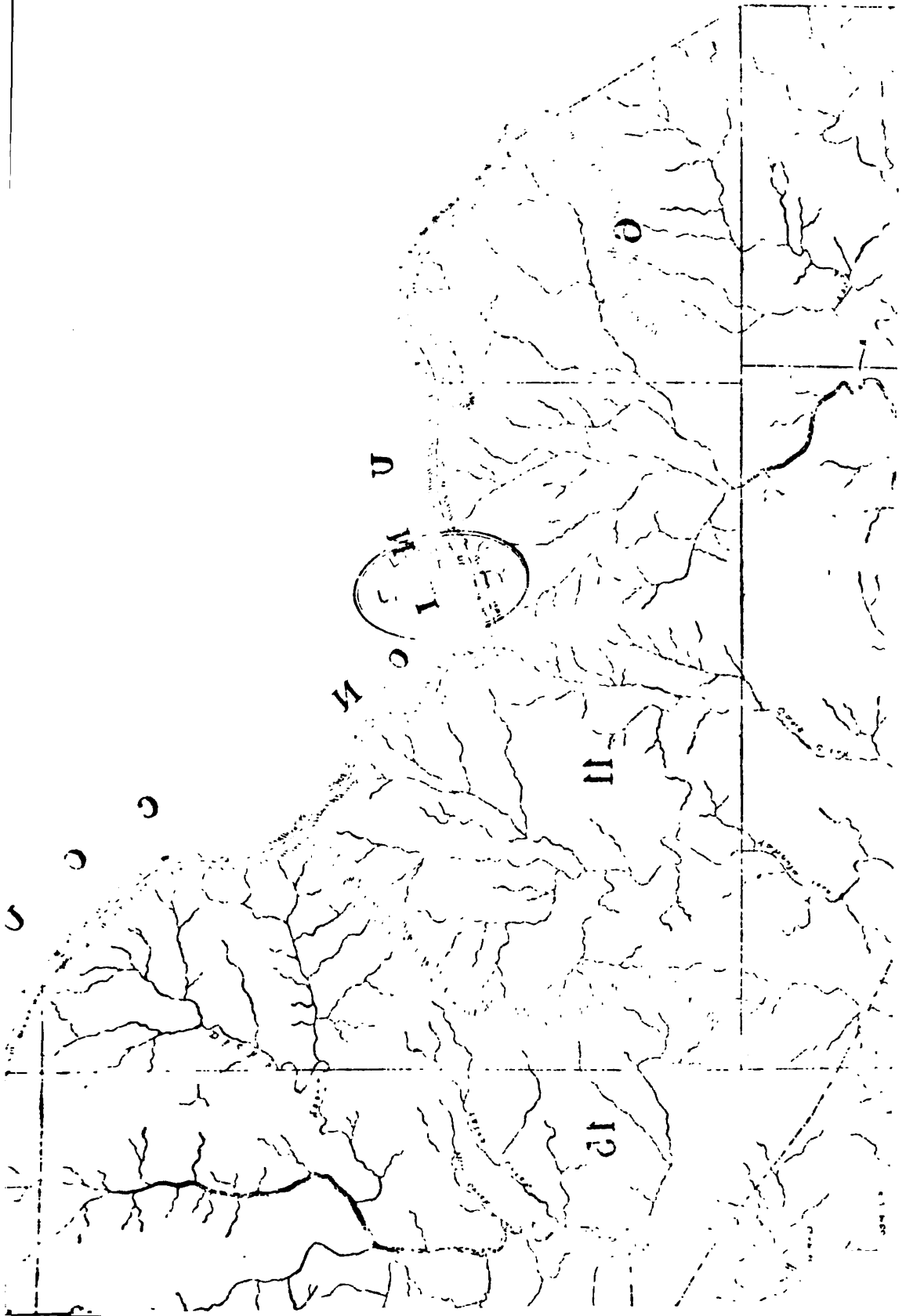
On lot 321, three pits, from fifteen to twenty feet, in depth, besides a number of open cuts, have been made, with a view of locating the gold-bearing vein which has supplied the placer. At the time of our visit, these openings were all so filled with water or earth, that it was impossible, to make a satisfactory examination of the veins, prospected, with the exception of a small vein, only a few inches wide, in an open cut, well up the hillside. This vein consists of iron-stained quartz, dipping with the mica-schists, the country-rock, at a high angle, to the southeast. It frequently shows free gold; but its true richness is revealed, only when it is crushed in a mortar and panned. The decomposed mica-schist, immediately surrounding the quartz vein, carries gold, making the entire ore-body about a foot in width. It is mere guesswork, to attempt to give any correct idea of the value of this vein, from the limited exposure. Nevertheless, the prospect is encouraging; and it certainly warrants a more thorough exploration.

Near by, other veins, similar in character, are reported to occur. One or two of these have, in time, been prospected. Yet, for reasons above stated, their size, and the character of the ore, which they carry, could not be ascertained, with any degree of accuracy.

The surface of the hillside, about the outcropping of the vein, and also the hollows, below, in places, are said to carry a sufficient amount of gold, to pay for working. These auriferous deposits are located in a rugged and mountainous section, and have apparently no connection, whatever, with any other deposits, in this part of the State. The country-rock and the vein material, however, re-

semble that, found in the gold-bearing belt, lying further south, which indicates both a synchronous and a common origin.

At a number of other places, within the county, gold is reported to have been found, in limited quantities. One mile west of Blue Ridge, on a small stream, flowing into Sugar Creek, some placer-working was done, a few years ago; and a number of pennyweights of gold were taken out; but the overburden, which had to be removed, mainly by hand, was so great, that the work proved unprofitable, and it was finally abandoned.





CHAPTER XXII

LUMPKIN COUNTY

BY W. S. YEATES, STATE GEOLOGIST ¹

GENERAL REMARKS

When we consider, that, in the latter part of the first half of this century, Lumpkin county was one of the most important gold counties in the Union, so important, in fact, that the Federal Government thought the demands of the industry, in this and the neighboring counties, sufficient to establish a branch mint at its county-seat, we may well wonder, why its hills and streams have been, for years, almost deserted by the miner; for, "in the forties," thousands of gold miners, scattered along the streams of North Georgia, were enthusiastically engaged in the crude methods of gold mining, which then obtained. The little country cross-roads, known as Auraria, in the southern part of Lumpkin county, then boasted of its hundreds of inhabitants; and a bank, two newspapers, and numbers of retail stores catered to the wants of this industrious town. Now, the place is barely a shadow of its former self. Decay has settled, like a pall, on the few houses, left to tell the tale of

¹ When field-work was begun on this county, I expected to be able to complete it, without aid; but the work was so frequently interrupted, by urgent calls to administrative duties in Atlanta, that I found it necessary, to assign a portion of the field-work to my Assistant, Mr. McCallie; though, in most cases, I have personally visited the properties examined by him.

its by-gone activity. A post-office in a small country store; one or two other small stores, which, with the first, supply the necessities of life for the immediate neighborhood; and, probably, half a dozen small dwellings, with a number of untenanted houses, too far decayed for human use, is all, that is left of lively Nuckollsville of "the forties." The name of the place was changed to Auraria, through the influence of Senator John C. Calhoun, of South Carolina, who then owned the Calhoun Gold mine, near-by. The oldest inhabitants tell us, that the primary cause of the desertion of the gold mines was the wonderful stories of great discoveries in California, in 1849. This is doubtless true, in a considerable degree; but, after nearly twenty years of active work, is it not true, that the gravel deposits were beginning to show considerably less profit, than formerly? The investigations, detailed in this bulletin, show, that comparatively little of the auriferous gravel deposits remain intact, and that many of them have been worked over, as often as three times, by the crude methods formerly employed. Comparatively little vein-mining was carried on, in those days; for it is easier and more profitable, to work the surface deposits, than to follow the vein down deep in the earth, especially when the veins are of low grade; and it is highly probable, that this had its influence on the average miner.

In a statistical table of the gold production of the South, compiled by Mr. Stuart W. Cramer, and published in the Report of the Director of the Mint for 1892, the amount of gold produced in Georgia, from the year of its discovery to 1892 inclusive, is estimated to be \$15,902,260, of which \$14,180,500 was produced prior to 1880. It is safe to say, that much the greater part of this was taken from the gravel deposits; and a large proportion of it, from Lumpkin county. Again, in an article on Lumpkin county, page 393.

WHITE'S STATISTICS OF GEORGIA, published in 1849, is the following, on the gold production of this county: — "From the best information I possess, the amount obtained from 1829 to 1838 was 16,000,000 dwts., and, from that time until now, 4,000,000, every year diminishing, notwithstanding the great improvements in machinery and increased practical knowledge." This estimate places the gold production of Lumpkin county, alone, at 20,000,000 dwts., during the first twenty years of the industry. While I am not prepared to say, that this estimate is founded on fact, and while it seems unreasonable, in this day; yet it should be taken into account, that, doubtless, much information, which was to be had, at the time, when the mines were being actively worked, has been lost sight of, in the long lapse of time. For instance, it was much easier, then, with the data fresh before one, to approximate the amount of gold, which went directly into the fine arts, than it is now, with practically no data, on which to base an estimate. If the larger part of the above estimates be credited to the auriferous gravel, the exhausting of these deposits would have a decided tendency to decrease the yield. From the statement above quoted, it will be seen, that, even as far back as 1849, and probably earlier, it was observed, that the production of gold was "every year diminishing"; and it is plain, that, even then, the gravel placers were beginning to show signs of exhaustion.

However rich some gold veins have proved to be; yet the finding of new placer areas is always the signal for a rush to the new fields. The great gold excitements, that, from time to time, have convulsed the world, were over wonderfully rich discoveries in gravel deposits. The discovery of the immense gold nuggets in Australia and California caused stampedes to the gold fields of those noted gold-producing countries. It is not at all unlikely, that the

immense golden treasures of the ancients were obtained almost entirely from the nuggets and gold dust, found in the old river beds of Asia.

But the accessible auriferous gravel deposits of the world are, now, nearly exhausted ; and man is forced to turn his attention to mining the gold veins, with their greater difficulties, to be overcome. This is just the condition, that confronts us in Lumpkin county ; and it accounts, to a large extent, for the comparatively little work, that has been done in this county, for so long a period. Even now, the miners sluice down the auriferous saprolites from the hillsides, and save what they can, even though, in many cases, it is attended by loss of the greater part of the gold. The mining people of the county appreciate the fact, that the veins are richer, especially below water-level; but, because the saprolite can be mined at the minimum of expense, and because they have not the means for putting up expensive modern plants, however desirable, they continue the practice of flooding from reservoirs. An instance of the loss, attending this, is referred to, in some detail, in the description of the Preacher mine, beyond.

The statistics, collected and published annually by the Director of the Mint, show, that there was a considerable spurt, in the gold production of Georgia, in the year 1882, jumping from \$125,000, in 1881, to \$312,500 the following year; and then decreasing, with only one exception, until 1891, when it was as low as \$80,622. By far the greater part of this increased activity was in Lumpkin county,¹ where many mines were being extensively worked, at that time. It is the general opinion, in the county, as far as I have heard it expressed, that bad judgment and incompetent manage-

¹ See table, p. 318.

ment, and even dishonesty, had much to do with the falling off of the industry, from 1882 ; but work on some of the properties was discontinued, because the free-milling ores, at water-level, gave place to the sulphide ores ; and these would not yield enough gold on the plates, to pay for working. It is probably true, also, that the failure of some of the low-grade ores, to yield a sufficient return, caused them to be abandoned. Though it has been only a few years since then ; yet it was not possible to work low-grade ores with such profit, as it is to-day, with the many recent improvements in processes ; nor can it be said, that the problem is yet completely solved ; for some inexpensive process, for recovering the gold from the extensive low-grade saprolite deposits, must be substituted for the present wasteful method of flooding these deposits through sluice-boxes into the mills.

One good result of the increased activity, in 1882, was, that a considerable number of excellent stamp-mills were erected, and most of these are in very good condition, now ; some, however, are in need of new mill-houses and general repairing. At present, there are, in the county, twenty-two stamp-mills, carrying 440 stamps, and one Huntington, and one horizontal Griffin mill. Of these, twelve stamp-mills, with 240 stamps, and the Huntington mill are in active operation. While some work was being done, at quite a number of mines, during the past summer and fall ;¹ yet, none of the properties were being worked, up to their full capacity. In studying the mines of Lumpkin county, one is impressed with the fact, that so little development has been done ; for not a mine in the county shows sufficient development, to rank it much beyond a good prospect. The reason for this has been indicated, above. However, I have frequently heard western mining men,

¹ 1896.

visiting the section, say, that, if these prospects were in the Western States, money, for development, could be secured, in any amount, without the least trouble.

DAHLONEGA

This town, the county-seat of Lumpkin, is still the most important mining town in Georgia. The name is a corruption of the Indian name, TAU-LAU-NE-KA, meaning *yellow money*. Dahlonega is delightfully located, in the southern part of the county, on a low, flat ridge, in the midst of the foot-hills of the Blue Ridge mountains, which lie from 12 to 15 miles to the north. It has an agreeable and healthful climate; and, in summer, it is quite a resort, for people, who are driven from the cities, by the intense heat.

Dahlonega may be reached by hack from Gainesville on the Southern Railway, which, by the shortest route, is twenty-one miles distant; or, from Ellijay on the Atlanta, Knoxville & Northern R. R., by the same means, over a distance of about 30 miles. Good teams are to be had at both places, at reasonable hire. The regular daily mail-hacks from Gainesville are usually patronized; but many persons prefer to hire special teams from the livery stables. Surveys have recently been made for a railroad, to run, from either Gainesville or Lula, on the Southern Railroad, to Dahlonega; and it is probable, that this road will be built, in the near future, for the use of steam or electric locomotion.

The branch of the United States Mint, which was established at Dahlonega in 1838, continued in active operation, until the breaking out of the civil war, in 1861. After the war, the Mint buildings

and grounds were given, by the Federal Government, to the trustees of the North Georgia Agricultural College, which is still a flourishing school. During the lifetime of the Mint at Dahlonega, \$6,106,567 were coined, principally in quarter- and half-eagles, the greatest amount, coined in any single year, being \$582,782.50, in 1843.

PORTER SPRINGS

PORTER SPRINGS, quite a famous health resort, is located at the foot of Cedar mountain, amid most picturesque scenery. During the summer, when the hotel is open for guests, an excellent line of hacks conveys passengers from Gainesville to the Springs. It receives liberal patronage from the wealthier class of citizens.

HISTORY OF GOLD MINING IN LUMPKIN COUNTY

It is claimed by the people of Lumpkin county, that the first gold, discovered in Georgia, was found, early in the year 1828, on the property, now so well known as the Calhoun mine, by Mr. Benjamin Parks, who, when I saw and conversed with him, in the early summer of 1894, had reached the advanced age of 94 years.

The story of the discovery, as related by Mr. Parks to Mr. P. J. Moran of the *Atlanta Constitution*, is, by courtesy of this gentleman, taken from one of his interesting papers on Lumpkin county, published in the *Constitution* in 1894, and re-published, as follows:—

"The gold," he mused; "yes, I will come to that. It was just by accident, that I came across it; the site is now that of the Calhoun mine. I was deer-hunting, one day, when I kicked up something, that caught my eye. I examined it, and decided, that it was gold. The place belonged to Rev. Mr. Obarr, who, though a preacher, was a hard man, and very desperate. I went to him, and told him, that I thought I could find gold on his place, if he would give me a lease of it. He laughed, as though he did not believe me, and consented. So, a lease for forty years was written out, the consideration of which was, that I was to give him one-fourth of the gold mined. I took into partnership a friend, in whom I had confidence. I went over to the spot, with a pan, and turning over some earth, it looked like the yellow of an egg. It was more than my eyes could believe.

"The news got abroad, and such excitement you never saw. It seemed, within a few days, as if the whole world must have heard of it; for men came from every State, I had ever heard of. They came afoot, on horseback, and in wagons, acting more like crazy men than anything else. All the way, from where Dahlonega now stands, to Nuckollsville, there were men panning out of the branches, and making holes in the hillsides.

"The saddest man, in the county, was Preacher Obarr, from whom I had leased the land. He thought the lease was a joke; but now he found out, that it was in earnest. One day, he came to me, and said:—

" 'Mr. Parks, I want your lease.'

" 'But I will not sell it to you,' I replied.

" 'Why not?' he asked.

" 'Well,' I answered, 'even if I were willing, it is now out of my

power; for I have taken a partner, and I know he would never consent to it. I have given him my word, and I will keep it.'

" 'You will suffer for this, yet,' said Obarr, menacingly, as he went away.

"Two weeks later, I saw a party, of two women and two men, approaching. I knew it was Obarr's family, intent upon trouble. Knowing Obarr's fondness for litigation, I warned my men to hold their own, but to take no offensive step.

" 'Mr. Parks,' were Obarr's first words, 'I want that mine.'

" 'If you were to pay me ten times its value,' I replied, 'I would not sell it to you.'

" 'Well, the longest pole will knock off the persimmon,' he said, threateningly.

"At that moment, Mrs. Obarr broke the sluice-gates, to let out the water. A laborer was in the ditch, and the woman threw rocks in the water, in order to splash him. Failing to make him aggressive, she burst into tears; when her son advanced, to attack him. I caught him by the collar, and flung him back. Then the party went off, swore out warrants against us, and had us all arrested. All this was done, for intimidation; but it failed to work; and the next thing, I heard, was, that Obarr had sold the place to Judge Underwood, who, in turn, sold it to Senator John C. Calhoun, of South Carolina; and then I lost a fortune.

"How was that?"

"Senator Calhoun wanted to buy my lease; and I sold it for what I thought was a good price. The very first month after the sale, he took out 24,000 pennyweights of gold, and then I was inclined to be as mad with him, as Obarr had been with me. But that is the peculiarity of gold-mining. You will go, day after day, exhausting your means and your strength, until you give it up.

Then the first man, who touches the spot, finds the gold, the first opening he makes. It is just like gambling — all luck.”

This old man firmly believed, that he was the first discoverer of gold in Georgia; but, since there is a strong claim made, that the first gold discovered was on Duke's creek in White county, in 1829, it probably will never be settled, which is correct. However, in Lumpkin county, at least, the Calhoun property is undoubtedly the first place, on which gold was discovered, by the white man. With this discovery, men went excitedly to work on the auriferous gravel deposits; and, as has been shown above, great activity prevailed, until these deposits ceased to be so profitable, as formerly. Then attention was given to mining the veins, principally by open-cut work and stoping, though, here and there, vertical shafts were sunk and tunnels were run. Many of the old tunnels, which are to be seen, on the various properties, are now lost to history. Enquiry of men, who have worked the properties for years, fails to reveal the identity of those, who did this early work. While activity ceased, to a large extent, toward the close of the second decade of the discovery; still, all work was not stopped, even during the civil war.

One of the most active and enthusiastic spirits of the flush times, was Dr. M. F. Stephenson, an amateur geologist and mineralogist, full of energy and the belief, that Georgia was one of the richest mineral States in the Union. All honor to this good man! While, in the light of the advances, that have been made in mineralogy and geology, since his day, one may smile incredulously, at some of the extravagant statements, made in his contribution to the mineralogy and geology of Georgia;¹ yet the amount of real good, done by this pioneer, can never be estimated; and his name should be revered, and his memory, forever cherished, by Georgians.

¹ The Geology and Mineralogy of Georgia; by M. F. Stephenson.

When, in 1849, the miners, from the various mines in the country around Dahlonega, gathered, to take action on the project of deserting the mines in Georgia, and going in a body to the new fields in California, this earnest believer in Georgia's great mineral wealth mounted the court-house steps in Dahlonega, and, addressing a crowd of about 200 miners, plead with them, not to allow their heads to be turned by the stories of the wondrous discoveries in California, but to stick to the Georgia fields, with their abundant promise of a great future. Pointing to Findley Ridge, which lay about half a mile to the South, he exclaimed: — "Why go to California? In that ridge lies more gold, than man ever dreamt of. There's millions in it." This last sentence was caught up by the miners, and taken with them to California, where, for years, it was a by-word among them. It remained to Mark Twain, who heard it in common use, in one of the mining-camps of California, to broadcast it over creation, by placing it in the mouth of his enthusiastic character, Col. Mulberry Sellers.

TOPOGRAPHY

The northern and northwestern boundary line of Lumpkin county is the crest of the Blue Ridge, and the county is made up of the foot-hills of these mountains with their intervening valleys. Black, High Tower, Grassy, Sassafras and Blood mountains are among the highest peaks on its northern border, the last named having an altitude of 4,486 feet above sea-level. Other mountains are Campbell, Long, Cedar, Findley Ridge, the Three Sisters, Turkey Hill, and numerous unnamed ridges, varying from 1,600 to 3,000 feet

above sea-level. Of these, Findley Ridge, lying half a mile south of Dahlonega, and extending northeast and southwest, for a distance of about three miles, is, to mining men, of the greatest interest; for, along its sides, lie the Capps, the Bowen, the Fish Trap, the Crown Mountain, the Columbia, the Stanley, the Preacher, the Bast and the Findley gold mines.

The county is well watered, all the valleys being supplied with streams of greater or less pretensions. The great artery of the county is the Chestatee river, which rises in the Blue Ridge, and flows south through the eastern part of Lumpkin, and between Forsyth and Hall, until it empties into the Chattahoochee river. Its chief tributaries are Tessantee, Yahoola and Cane creeks, the last two flowing, the one by the northeast, and the other, by the southwest, end of Findley Ridge. Probably no stream in Georgia has greater local reputation, as a gold-mining stream, than the Yahoola. Along its banks, lie the Findley, the Lockhart, the Singleton, the Tahloneka, the Hand, the Yahoola and the Mary Henry gold mines; and the tailings from their mills have been, for many years, emptied into this stream, with a considerable quantity of auriferous sulphides, which passed over the amalgamated plates, without giving up their gold content. Much of this débris has been carried into the Chestatee river, during flood times; and considerable of the gold, thus borne along, has been recovered from this stream by dredges, which have been worked with flattering success. In the northwestern part of the county rises the Etowah river, which, also, flows south through Lumpkin, continuing on through Dawson, Cherokee, Bartow and other counties, till it unites with the Oostanaula at Rome, to form the Coosa.

An important economic feature, in the topography of the county, lies in the fact, that the source of water-supply, for working the

gold mines, is the Blue Ridge on the northern border, while the mines themselves are in the southern, or lowest, part of the county, thus giving a fall of from 1,000 to 1,500 feet, in a direct line, of from fifteen to twenty miles. I do not mean to suggest, that it would be at all practicable, in such a mountainous country, to bring a mining-ditch over a direct line. There are already in the county several very satisfactory ditches, which supply the various mines with water, the principal one being that, known as the Hand Ditch. As a rule, these ditches have furnished abundant water, for operating the mines; but, during the past summer,¹ which has been the driest known to the inhabitants, for forty or fifty years, the tax on the volume of water, supplied by the mountain streams, has been much too great; and a number of the mines were forced to shut down, for lack of water. In planning the ditches now existing, it has not been found necessary to go to so great an altitude, for the source of water-supply, as was mentioned above.

The hills and mountains of the county are covered with an abundance of pine, chestnut, hickory, oak etc., sufficient to supply all demands for fuel, both for mining and domestic consumption, for many years to come. Much of this is virgin forest. A good view of the timber, which covers the surrounding country, may be had, from any one of the higher ridges in the county; and the dense foliage, which stretches out, below, to the horizon, contributes no small part to the beauty of the scene.

The scenery, which one observes along the ridges, valleys and streams, adds greatly to the pleasure of travel through the country. One of the most striking features is Cane Creek falls, on a pretty drive of two and a half miles from Dahlonega. At this point, Cane creek dashes over a huge mass of hornblende-schist, down

¹ 1896.

thirty or forty feet, frothing and sparkling, till the waters eddy off in the stream below.¹

GEOLOGY OF THE GOLD DEPOSITS

The difficulties, attending an attempt to study the geology of the gold deposits of this county, are greatly augmented, by the fact, that the unaltered rocks are usually buried below many feet of saprolite ; and, that, only in rare instances, has work been done in the mines, sufficient to place unaltered material within reach of the geologist. With the exception of the hornblende rocks, the dumps are almost barren. It is true, that, occasionally, unaltered gneiss or mica-schist is to be found ; but it is impossible, at the present time, to get anything like a complete series of the unaltered rocks. Hence, reliance must be placed, to a large extent, on what it is possible to get, from a study of the saprolites. It is this, that renders the work, at this stage of development of the mines, very difficult, and not altogether satisfactory. Moreover, the demand for the economic information, contained in this bulletin, is so urgent, that I am compelled, for the present, to subordinate careful laboratory study of the rock material, to the economic necessities, trusting, that, later on, I may be permitted to properly present these scientific details, which may shed additional light on the subject.²

The principal rocks of this county are gneisses and schists. They have been generally referred to the Archæan. In the valleys, these rocks are covered with four or five feet of alluvium and detrital

¹ See Plate XX.

² See p. 319.

wash from the hillsides. Where exposed, they are decomposed, from the surface down, in varying depths, to a hundred feet or more, this material having been very aptly termed "saprolite," by Dr. Becker.¹ Besides these rocks, there are to be seen quartzose slates, granites and massive quartz in veins.

The gneisses and schists are intimately related, often shading from the one form to the other, in the same mass. Indeed, as observed by Dr. Becker,² the schist is "immediately recognizable, as derived from gneiss." They are divisible into two classes, those containing mica, and those containing hornblende, as an essential constituent.

THE ORDINARY GNEISSES AND MICA-SCHISTS

These are, by far, the most abundant rocks in the county. In places, the gneiss predominates; though gneissoid mica-schists more generally abound. Outcrops of a highly feldspathic gneiss are of frequent occurrence, along what are known as the upper and middle Gainesville roads, for a distance of six or eight miles from Dahlonga, beginning east of Yahoola creek³ and south of the Chestatee river. It seems to be the predominant country-rock of that section of the county. Muscovite and biotite are the prevailing micas, though hydrous micas are characteristic of some of the schists, as will be seen, further on.

In the saprolite condition of these rocks, the feldspar and mica have been subjected to surface alteration, the iron oxides, set free from the micas, imparting, usually, brilliant tints of red, yellow,

¹ Loc. cit., p. 34.

² Op. cit., p. 15.

³ The Hand mine is an exception to this.

gray etc., to the mass. The gneissic and schistose structure of these saprolites is, as a rule, quite as distinct, as before alteration.

Many of the mica-schists are garnetiferous; and, in the gold district, the garnets often contain gold. Some of the schists enclose more or less well-defined quartz veins, some of which are auriferous, the schists themselves sometimes containing gold; others contain thin ribbon veins and lenses of auriferous quartz, both much distorted, the whole mass constituting an ore-body; still other schists, in belts, are auriferous, even though no quartz may be present. This is explained by Dr. Becker, as resulting, probably, from the passing away of the quartz in solution, leaving the gold behind.¹ These rocks are almost barren of well crystallized minerals. The disintegrated *débris* shows the following accessory minerals:— Gold, garnet, kyanite, magnetite, ilmenite, pyrite and chalcopyrite. Most of these are to be found, also, in the veins of the district, besides which the occurrence of allanite, apatite, chalcocite, malachite, limonite, hematite, pyrrhotite, siderite, tetradymite, tourmaline, chlorite, galena and pyromorphite has been noted, from time to time.

THE YELLOW AND BLACK BELTS

When one visits, for the first time, the mines around Dahlonega, he hears, with some confusion, much talk about the "Yellow" and the "Black" belts; and he soon finds, that great stress is laid on these, by the miners, as gold-producers. The schists of the "Yellow Belt" contain gold throughout, they say; while, as a rule,

¹ *Op. cit.*, p. 44.



VIEW IN THE OPEN-CUT OF THE SINGLETON MINE, DAHLONEGA, GEORGIA, SHOWING CONVOLUTIONS OF THE HYDROMICA SLATES.



the veins only, of the "Black Belt" are gold-bearing. These names apply to certain yellow and nearly black schistose saprolites, which are to be found at a number of the mines, along Findley Ridge. They alternate with each other, forming a series, which strikes, as a rule, N. 50° to 70° W., across the ridge, and dips, usually, from 35° to 50° to the northeast, the trend of the belts being about N. 70° E. There are at least two of the yellow belts and three of the black belts, varying from forty to three hundred and fifty feet wide. This series lies south of, and adjacent to, the large dike of hornblende-schist, mentioned elsewhere in this report; and it constitutes the crest of Findley Ridge.

In one instance, at least, I was able to identify the material of the so-called yellow belt, as the saprolite of a pearl-gray hydromica-schist, which I found in a shallow shaft, in the bottom of the open cut of the Bast mine, on Findley Ridge, where it was easily traceable, from the completely altered to the unaltered material. As to the "Black Belt," a quartzose slate, underlying its saprolite in the Findley mine, seems to be the unaltered material. It contains considerable dark-green chlorite, of a species, not yet determined. This slate constituted the largest part of a dump-pile, which had been taken from an eighty-foot shaft, at the bottom of the open cut, which was sunk through the black slates, to a considerable distance, in the underlying quartzose schists.

The saprolite of "THE BLACK BELT" is strikingly different, in appearance, from that of the "Yellow belt." The former has a decidedly slaty cleavage, and is colored by manganese and iron oxides, the brownish-black predominant color being characteristic. In tunnels, where the tints are brought out, by the condition of moisture, they sometimes present great beauty, being banded and flecked with rose, white, delicate blue, dark brown, buff and golden

yellow. These schists usually cleave, along parallel planes, into thin slates, and are quite smooth, on the cleavage surface. They are very brittle, because of their decomposed condition, though they are sufficiently impregnated with manganese and iron oxides, to render them somewhat hard. Folds in these slates are not uncommon. An interesting series of anticlines and synclines, with arches not exceeding six feet in height, may be seen in the slates of "the Black belt," in the north tunnel of the Crown Mountain property, with one of the yellow belts overlying it. No bands occurring in the latter, folds are not easily discernible; and, in this particular instance, I do not remember to have noticed any.

"THE YELLOW BELT" is also known, among the miners, as the "Soft belt." These yellow decomposed schists are compact, and very soft, crumbling readily between the fingers. The schistose character of these is less easily perceptible, than in "the Black belt"; but the lengthening of the individual grains, in the plane of schistosity, seen on a transverse fracture, would fix their character. The mass is of ochre yellow; but red, white and, sometimes, black are sprinkled all through it. This material, with its vein content, is easily worked for gold, with the hydraulic giant and the system of flooding from elevated reservoirs. The slates of the "Black belt" are not so easily worked by this method; but the giant may be used to a limited extent.

OTHER MICA-SCHIST SAPROLITES

That a number of other varieties of mica-schist are to be found in the mines in Lumpkin county may be expected; but their sapro-

lites do not vary sufficiently among themselves, to afford positive differentiation, without proper laboratory study. They vary from normal gray to a brownish gray. These seem to retain their original character, to a more marked degree, than the schists of either the "Yellow" or the "Black belt." It is frequently the case, that the mica still shows the strong pearly lustre, so characteristic of the unaltered material. Some of the masses, like the schists of the "Yellow and Black belts," show little, if any, crumpling; while others are much crumpled and plicated. Of the former, is the gray schist, of which much of the unaltered rock was blasted out, at the Chestatee mine, in building the plant for working the bed of the Chestatee river. A good illustration of the latter is the saprolite of the Singleton mine. A fold in these may be seen in Plate XIV, by following the curve indicated by the white feldspathic band. The axis is just beyond the position of the two miners, in the picture. The schists in this mine show as striking crumpling, as any, I have encountered in the county. Where feldspar or quartz bands occur with bands of mica or hornblende, the contortion is distinctly seen, and is, at times, remarkable. The mica of the schists, from the two mines mentioned above, are muscovite and biotite. Quite recently, I have been able to secure unaltered specimens of the schist from the Singleton mine; and it is of the ordinary gray muscovite-biotite variety, totally unlike the unaltered material of the "Yellow" and "Black belts"; although some of the leading miners of the section have confused the mica-schist saprolite from this mine, with that of the "Black belt." However, there are, here and there, in this mine, streaks of chlorite, resulting from the alteration of biotite.

THE HORNBLLENDE-SCHIST

This rock leaves, on alteration, a harsh, friable, brownish-yellow mass, with a multiplicity of joints, slightly oblique to the plane of schistosity, causing the material to break readily into small prismatic blocks, with more or less perfect rhombic cross-sections. These are known, among the natives, as "brick-bat." Referring, on one occasion, to a dump-pile of hornblende-schist, at one of the mines, I asked a miner, what it was called among his fellows.

He promptly replied: —

"Brick-bat gone hard," showing, that even the common miner recognizes the transition of the rock from one condition to the other.

Many unaltered specimens of these rocks were examined by me, with the aid of a Browning triplet of $\frac{5}{8}$ -inch focus. They varied from the finest grained schist, in which neither feldspar nor quartz was visible to the unaided eye, to that, beautifully marked with minute layers of white quartz, more or less discontinuous. All these specimens, under the lens, showed grains of quartz; and the layers, visible to the unaided eye, were composed of very finely granular quartz. I did not observe any diorite in Lumpkin county; yet it has been observed in several localities, in North Georgia. In his *Reconnaissance of the Gold Fields of the Southern Appalachians*, Dr. Becker states,¹ that Dr. Hayes has found, in Cobb county, to the southwest of the Franklin mine, "areas of dark diorite some miles in diameter, which pass over into schists, similar to those at Dahlonega and elsewhere."

¹ See p. 17.

Fig. 21



Sketch Showing Cross-section Outlines of Altered Hornblende Masses, A and B, as they Appear on the South Wall of the East Tunnel, Crown Mountain Gold Property.

These sheared hornblende belts vary in width, from a few inches to half a mile. They are intercalated among the gneisses and mica-schists, having, as far as noted, the same schistosity. I observed, that the shearing passed directly from the one kind into the other, of these rocks, showing, that the hornblende rocks were intruded, before the dynamo-metamorphic action, which produced the shearing, and which changed much of the gneiss into mica-schist. I use the word, "intruded," because it seems to me highly probable, that these hornblende rocks are very ancient dikes, which had their positions in the country-rock, anterior to the dynamo-metamorphism, which left them gneissic and schistose, as they are at present. It is not to be expected, that, after passing through such deformation, they would retain their original characteristic outlines; but, that they would be more or less distorted. This distortion introduces, in part, at least, the element of doubt, which exists, as to their genesis. But, as positive proof is still lacking, the word, "dike," is used, hereafter, tentatively.

In the east tunnel of the Crown Mountain property, half-a-mile south of Dahlonega, two small masses of altered hornblende-schist are cut through, which I take to be apophyses from the immense dike, which is crossed, in coming up the mountain from Dahlonega. In fig. 21, I have represented the outlines, made by these two masses on one of the walls of the

tunnel, which is six feet high. In this tunnel, the uninterrupted continuation of schistosity between the micaceous and the hornblende rocks, mentioned above, may be plainly seen.

Two similar limbs were cut through, in the north tunnel on this property; these are more fully noticed, in the description of the Crown Mountain property, further on.

Beginning on the west side of Dahlonega, I traced one of these ancient dikes, for a mile, to Yahoola creek. Its course lies, generally, N. 70° E., passing through the Hand mine to the creek, and, probably, beyond. Its width varies from 200 to 250 yards. It is well exposed along the road at the Hand mine, where it is deeply cut by a small stream. About twenty yards southeast of this point, is the outcrop of another dike. This one is half a mile wide, both at the creek, and where it is crossed, in Dahlonega, by what is known as the middle Gainesville road. The belt of mica-schists, lying between these dikes, presents the cross-section of a lens, at the surface, for about three-quarters of a mile, approximating 250 yards wide, nearly this entire distance. In Dahlonega, along the street terminating in the middle Gainesville road, it seems to disappear; and little, if any, mica-schist saprolite was observed, though the belt again appears along the road, just beyond the college, about 250 yards west of the street mentioned, where it is fifty yards wide. At the Ivey mine, this belt again widens considerably. At the east end of the lens, in the road at the Hand mine, the adjacent margins are, as stated above, only twenty steps apart. At the top of the hill, southwest of this point, and about a hundred yards away, the margins are 60 or 70 yards apart. From this hill, the north margin of the lens strikes N. 55° E., and the south margin, N. 35° E. The general trend of the contact between the mica-schist and the dike on either side, except near the points of the lens, as they appear at the surface, is N. 70° E. It is in these mica-schists, that the Free Jim mine has been sunk. The larger dike has

its south margin lying along Findley Ridge, near its top; and it forms the hanging-wall of the Findley, the Bast, the Griscom, the Preacher, the Columbia, the Crown Mountain, the Bowen and the Capps mines. For want of time, the dike was not traced by me farther southwest through the county; but it, doubtless, may be identified with one of those, in that part of the county. On the Turkey Hill property, near Auraria, on the southern side of the Chestatee river, there are two dikes, side by side, separated only by a narrow belt of mica-schist, which contains one of the larger auriferous quartz veins of the property. These dikes, which, together, are about two hundred yards wide, cross the middle Gainesville road, about five miles southeast of Dahlonega. It is likely, that they may be identified with the outcrops in Auraria; as their strike, N. 70° E., would lead one to expect outcrops at that point. Another narrow dike crosses the middle Gainesville road, seven miles southeast of Dahlonega. Two and a half miles northwest of Dahlonega, the waters of Cane creek dash over a forty-foot precipice of hornblende-schist, part of a dike about 300 yards wide, which runs parallel with the others described.¹ Four others, of varying widths, are to be seen crossing the road, between this one and Dahlonega.

Very little gold has been found in these dikes, the comparatively few quartz veins, occurring in them, not containing enough of the precious metal, to class them as auriferous, from an economic point of view.

Some of the more intelligent mining men claim, that the Yahoola runs along the line of a considerable displacement. The fact, that there is no continuity, in places, between the rocks on either side of the creek, and that there is such a difference in their character, at such points, along the two banks, suggests a ground

¹ See Plate XX.

for the claim. As a rule, the rocks east of the creek are much more gneissic in character. The veins of the Singleton mine, which extend to the creek, have not been found beyond it. Hornblende rocks on the west side, striking across the creek, suddenly give place to ordinary gneisses on the other side. A series of mica-schists, including those of the yellow and black belts, borders the southeast edge of the large dike, for a distance of about 250 yards along the creek. The strip, running north and south, is hardly more than a hundred yards wide. However, tongues of the dike cut through this strip to the creek. In these mica-schists is the Lockhart mine.

That there is some sort of connection, between these hornblende masses and the auriferous deposits, has long been the observation of both miners and geologists, familiar with the section; for these masses are always numerous in the auriferous districts; and, in many instances, they are either the hanging- or foot-walls of the auriferous quartz veins. Along the northeast side of the hornblende mass, marked B,¹ in the east tunnel of the Crown Mountain property, runs a small auriferous quartz vein, varying from a half-inch to four inches in thickness, on either side of which is a pale-yellow clay, three or four inches thick, streaked with red bands, parallel with the quartz vein. This forms a sharp line of contact between the hornblende- and mica-schist saprolites. At the Singleton mine, the immense mass of hornblende-schist, which constitutes the northwest half of the hill, in which most of the work has been done, is the foot-wall of the best producing vein of this mine.² At the Turkey Hill mine, two dikes are the foot-walls of the three-foot and the twelve-foot auriferous veins, the mica-schists, in which the two veins occur, being comparatively narrow bands. All along

¹ See fig. 21.

² See figs. 26, 27 and 28.



DIORITE DIKE, LYING ON THE NORTH OF THE OPEN CUT, SINGLETON MINE, DAHLONEGA, GEORGIA,
ALONG SIDE OF AN AURIFEROUS QUARTZ VEIN.



Findley Ridge, the large dike, as is mentioned above, is the hanging-wall of the auriferous deposits at the various mines. Other instances might be cited, which would show the juxtaposition of these metamorphosed dikes and bodies of ore.

The comparative scarcity of quartz veins in the dikes is probably due to the toughness of the hornblende rocks, with their interlocked acicular crystals, and to the readily fissile character of the surrounding mica-schists and gneisses, the latter offering feeble resistance, and fissuring easily, thereby relieving the strain. It may be, that this had much to do with the gold veins lying up against the dikes; since, on account of the resistance offered by the hard hornblende rock, the strain would find a vent between the mica-schists and the dike.

GRANITE DIKES

Granite dikes seem to be of rare occurrence in the gold belt of Lumpkin county. I saw one crossing a tunnel of the Mary Henry ¹ mine near the mouth of the tunnel. The quasi-granite at the Mary Henry gold mill on Yahoola creek, which shows a slight shearing, may also be of igneous origin. Mr. McCallie informs me, that he observed granite dikes, near the Cora Lee property, in the north-east end of the belt.

¹ Referred to, as the Murray mine, in Becker's report.

QUARTZOSE SLATES

About three quarters of a mile northeast of Dahlonega, on the upper Gainesville road, quartzose slate outcrops, for a quarter of a mile along the road, being especially noticeable, near the 1-mile post. The parallel planes, along which the fine-grained saccharoidal quartz is arranged, in bands from an eighth to a quarter of an inch thick, between thin layers of mica; and the facility, with which it cleaves along these mica layers, leaving large surfaces of the outcrop perfectly flat and smooth, is apt to strike the passer-by, as unlike the features of any other rock, he has seen before, in this section of the country. About a hundred yards northwest of the mile-post mentioned, in one of the tunnels of the Mary Henry mine, may be seen the saprolite of this schist. Its structure consists of straight, parallel, white, lead-colored and yellowish-gray bands, from a thirty-second to a quarter of an inch in thickness. The white bands consist of kaolin; the yellowish-gray, of kaolin with minute particles of partially decomposed chlorite, the liberated iron oxide slightly staining the band; and the lead-colored, of small, glassy quartz grains, with very finely divided particles of decomposed mica, intimately mixed with them, giving the bluish-gray color to the bands.

As has been noted, in another part of this report, the unaltered material of the saprolite, known as the black slates, is also a quartzose slate; but, while the two rocks are lithologically similar, still the weathered product of the one is totally unlike that of the other; and they will, probably, be found to be historically and economically dissimilar.

ROCKS OF MORE RECENT ORIGIN

Along the streams, spreading out over the valleys, and sometimes occurring even well up on the ridges and hillsides, may be seen one or more of the unconsolidated sedimentary rocks. Boulders and pebbles, from the upturned auriferous gravel beds, are scattered over much of the lower levels of the gold belt ; and, here and there, they may be found even along the tops of ridges ; detrital wash from the decomposed gneisses, schists and disintegrated quartz veins, which the rains have brought down from the hillsides, is now, and has been for ages, forming valley deposits ; while clay-beds, reaching nearly to the tops of ridges, were, probably, deposited, either by slack water, during one of the later geological periods, or, as a result of the degradation of the ridges themselves. On top of these, when it has not been washed away, are a few inches of rich soil, especially in the valleys.

THE GRAVEL BEDS

Before they were worked for gold, the gravel beds lay in place, on top of the bed-rock, covered with detritus, consisting of clay, sand etc. The boulders and pebbles, which, with their interstitial sand and clay, compose these beds, are formed from the gradual breaking away of the quartz veins, which may, or may not, be gold-bearing. As these angular quartz fragments are carried along, by the smaller streams, and by creeks and rivers, during times of freshet, they roll and tumble against each other, and the sharp

angles are gradually rounded, the water with its burden of finer detritus giving the pebbles their smoothness. The distance, traveled by a quartz pebble, is indicated, in a general way, by the degree of wear on its angles; those derived from veins close at hand, having the angles only a little worn; while those, that have traveled long distances, and have been acted on, by the water and its finer solid matter, during a long period of time, have lost all angular appearance, and are bounded by sharp, more or less symmetrical curves. Between these two end types are many variations. The first type is well shown in gravel piles, which I saw at the Turkey Hill mine; but the middle type is the usual form of pebble or boulder, which one sees on the rock-piles of the placers in the auriferous belt of this county, the well rounded type being of rare occurrence. It is plain, that the rule, given for estimating, in a general way, the distance traveled by a quartz pebble, will not apply to a gold pebble; for the much greater specific gravity of gold (19.25 to 2.65 for quartz) will prevent its being carried by the waters, as a quartz pebble would be. Besides, the softness of gold would cause it to wear rapidly, and become round and smooth, with only a short distance traveled. Belonging to the State Museum are fourteen such gold pebbles, weighing within a small fraction of fourteen ounces, the largest weighing 56 dwts. 14 grs. These are from the Hamby Mountain gold property in White county; and it is hardly probable, that they could have traveled a great distance, though they are well rounded, polished and bright. The beds of gravel usually occur along small streams, remnants of what were, in the later geologic periods, streams of considerable size. Some of the larger streams, of present time, show a shifting of beds; and, in some cases, the beds of the present streams are many feet below, and to one side of, a former bed.

A notable instance of this is the old bed of the Yahoola creek, on lot 1,099, 12th district, where the creek bends around the northeast end of Findley Ridge. The old bed, if we begin our examination near the creek, widens out up the gradually sloping side of the ridge, until it attains an altitude of about 150 feet above the present bed of the stream, showing how the creek has gradually shifted downward to its present position, as it cut its way through the decomposed rocks.

Mixed with the pebbles and bowlders of the gravel beds, forming an inferior cement, is the coarser sand and some clay, dropped by the currents. As the stream becomes more sluggish, finer material is deposited, until the running water leaves its former bed high and dry.

As to the age of the gravel beds in this county, there is little evidence in the beds themselves, beyond the fact, that they are in place, and that recent detritus is deposited directly on them, assuring us, that they belong to some one of the later periods. In one instance, at the Singleton mine, where the gravel slopes, from about 20 feet up the mine hill, down toward the present bed of the creek, there were found, two or three years ago, while working the auriferous gravel, fragments of wood and cones, in the blue clay immediately overlying the gravel. Samples of these were submitted, by Dr. Becker, to Dr. F. H. Knowlton, Assistant Curator and Paleobotanist in the National Museum at Washington, who referred them to the Pleistocene.¹ Referring, again, to this same deposit, Dr. Becker says: —² "At the Singleton mine, there are stream-bed gravels, overlain by blue clay, containing fragments of wood and cones. The slack water, indicated by the clay deposits, judging from these plant remains, is referable to the last well-marked subsidence of the

¹ Op. cit., page 46.

² Op. cit., page 52.

coast, answering to the Columbia formation." The clew, given by these cones and fragments of wood, applies, presumably, to the other gravel beds of the section.

RECENT VALLEY DEPOSITS

It is probable, that the deposits of sand, which lie immediately next above the gravel beds, and cover the floor of crystalline schists, where no gravel was deposited, belong to the same, or an immediately succeeding, epoch, as that of the gravel beds; but detrital deposits have been forming ever since, some of the earlier of which may be Pleistocene, but much of which must belong to the Recent period of the Quaternary. From two to five feet of these deposits are to be found, covering the gravel; and this must be removed, before the auriferous beds are accessible for work. The lower layers have doubtless been deposited by running streams; but the top layers result from the rain-wash from adjacent hills. These deposits consist chiefly of sand or sandy clay, with a few inches of soil at the top. On pages 86 and 87, sections of this class of material are given, in the description of the gold deposits of Rabun county, which are typical of these valley deposits.

HILLSIDE CLAY DEPOSITS

Along the north side of Findley Ridge, may be seen a brownish-red, plastic, transported clay, which extends nearly to the top of the ridge. On the middle Gainesville road, it overlies the saprolite of the horn-

blende schist ; and, at first, I was disposed to consider it a more complete alteration of this rock, than I had before encountered. At the entrance to the north, south and east tunnels of the Crown Mountain property, I found the same clay ; and, in each case, the clay was the outside layer. In the north tunnel, which is 35 feet lower than the top of the mountain, the distance, along the floor, from the entrance to the point of contact between the clay and the yellow schists, was 50 feet ; in the south tunnel, 45 feet below the mountain top, it was 48 feet ; and in the east tunnel, 75 feet below the top, it was 56 feet. In each case, the clay rested unconformably on the schists. There were neither veins nor pebbles in the clay ; but, near the point of contact with the schists, a scant stratum of angular fragments of quartz was observed, following a former contour of the ridge. As the schists were approached, the brownish-red of the clay changed to ochre-yellow. On the broad top of the mountain, I observed quite a number of water-worn pebbles and small boulders, though they were not abundant. At one point, on the north side, about 40 feet below the highest point, I observed a considerable number of small boulders, scattered over a surface, of not more than 200 square feet. I saw nothing that would establish the age of this clay, though, as before stated, it must belong to one of the later geological formations.

SOIL

On the top of all these rocks, when not denuded, occurs the soil. This is composed of organic matter, from animal or vegetable remains, filtered into and well distributed through the loose, porous, unconsolidated rock, whether it be detritus or saprolite. The soil

saprolite and in the partially decomposed rock, there are numerous slickensided surfaces, stained black with manganese, probably in the form of wad. Such slickensides, in such positions, are abundant throughout the belt; but I have looked in vain for anything of the sort below water level. It would seem, that the slickensiding is due only to the changes in volume attending decomposition, of which, also, the manganese stains are a result."

THE AURIFEROUS DEPOSITS OF LUMPKIN COUNTY

DISTRIBUTION

The DAHLONEGA GOLD BELT, as will be seen, on the map of the auriferous deposits, between pages 32 and 33 of this bulletin, enters the State from North Carolina, on the northern boundary of Rabun county; and, continuing southwesterly, it passes through Rabun, Habersham, White, Lumpkin, Dawson, Forsyth, Cherokee, Cobb, Bartow, Paulding, Polk and Haralson counties, and extends about 50 miles into Alabama, where it has been designated by Dr. Wm. B. Phillips of the Geological Survey of Alabama, as *The Upper Alabama Gold Belt*.¹ That part of it, which lies in Lumpkin county, seems, so far, to be its richest portion; but other parts of the belt have commanded much attention, containing as they do, some of the best mines in the State. This belt, which is five miles, at its widest part, comes in from White county, due east of the center of Lumpkin; and, continuing near the southeast border of Lumpkin, it passes into Dawson county, on the southwest.

¹ Bul. No. 3. Geol. Sur. of Ala.; by Wm. B. Phillips, Ph.D.; p. 11.

Between these boundaries, the mines are scattered along the belt, being continuous from Dahlonega to Auraria, and beyond, but skipping three or four miles northeast of Dahlonega, in the direction of Cavender's creek.¹ The conditions are not ripe for a division of the belt, in this county, into mining districts, if indeed, there should ever be occasion for it; but it is all generally known as the Dahlonega district. With a few exceptions, the greatest activity has been exhibited in the mines, immediately around Dahlonega, the most prominent of which, in the past, have been the Findley, the Bast, the Griscom, the Preacher, the Columbia, the Fish Trap, the Ivey, the Hand, the Singleton and the Lockhart. Immediately around Auraria, the most important mines are the Hedwig, the Betz, the Battle Branch and the Josephine. About half way between these towns is the Barlow mine, which, by many, is considered the best in the county. Its saprolite has been worked on a larger scale, than that of any other mine. On the south side of the Chestatee river, the Calhoun and the Turkey Hill are the most noted mines. The only mine in the northeast part of the belt, that has been considerably worked, is the Garnet. With the exception of the fractional lots along the river, all the lots south and east of that stream are 250-acre lots. All other lots in the gold belt are 40-acre lots, except the fractional lots in the 12th district, adjoining the 13th, and along the county-line of Lumpkin and Dawson, where 40-acre lots lie partly in Lumpkin and partly in Dawson.

NATURE OF THE DEPOSITS

In Lumpkin county, the auriferous deposits consist of gravel-beds, mica-schists and quartz veins in mica-schists, some of the

¹ See map of the gold belt in Lumpkin county.

last named being well defined, while others consist of more or less discontinuous lenses and ribbons in belts of schist, which is itself often auriferous. These belts, with their auriferous quartz content, have been called "*Stringer Leads*", by Dr. Becker.¹ The views of this geologist and myself are in harmony, as to the formation of what some have called "bedded veins", that is, veins which occupy positions between the schists; nor can there be, in the light of recent progressive geological thought, much room for difference of opinion, on this subject. But, in the past, it has been thought by some able geologists, that these were "bedded veins", and by others, that they were "segregated veins"; and some mining engineers and miners, even now, hold, that they are bedded veins, advancing the idea, that such veins have no continuity downward, and that they will soon "give out". Such views could not be farther from the fact. It was formerly held, that the crystalline rocks were metamorphosed sedimentaries; but this is true, only in part. Examples of what I take to be changes from granite to gneiss are to be found in Lumpkin county. The granite across Yahoola creek at the Mary Henry mill, before referred to, constitutes a case in point, the rock being only slightly sheared, and much of it appearing to be true granite.

In 1835,² Messrs. T. G. Clemson and R. C. Taylor pronounced similar quartz masses, in the gold regions of Virginia, contemporaneous with the formations, in which they occur. In 1837, Prof. Silliman asserted, that the auriferous quartz deposits in Virginia, examined by him, were beds. In 1854, Prof. J. D. Whitney classed the North Carolina deposits, seemingly, as "segregated" veins, "originating in the gradual elimination of the component particles from the

¹ Op. cit., p. 37.

² For the historical data immediately following, I am indebted to the excellent report of Dr. Becker, so often referred to, and quoted, by me, in this report.

surrounding formation";¹ but, in later works, he considered similar **deposits** in California, to be what Prof. Rogers had, before, called veins of injection. Prof. Ebenezer Emmons, State Geologist **of** North Carolina before the civil war, regarded the gold in the **impregnated** slates as sediment, contemporaneous with the **slates**. He observed, however, that the quartz deposits were real **veins**, conforming with the slates only approximately. In 1859, Mr. **O. M.** Lieber gave it as his opinion, that the gold was contemporaneous with the rocks, but that it took the form of segregations, at a **later** time. Prof. Herman Credner took the position in 1867, that **the** auriferous quartz deposits in the schists of the Southern Appalachians were beds, and that "true veins" had no existence in this section. Prof. W. C. Kerr, long time State Geologist of North Carolina, after the civil war, wrote, in 1875, as follows:—"Many of these quartz veins are in reality beds, as they coincide, in dip and strike, with the stratification, whilst an equally great number run in every conceivable direction, and dip just as irregularly".² Mr. J. A. Phillips, in 1884, referred to these deposits as segregated veins, using this term as the equivalent of bedded veins, and expressing a doubt, as to whether there was any difference between these and so-called "true" veins, except as to position. But, as far back as 1836, Prof. William B. Rogers, State Geologist of Virginia (1835-'42), indicated that the auriferous quartz veins of that State were "true veins of injection," observing, that, while the dip and strike of the veins generally conformed to those of the enclosing strata; yet, the conformity was far from exact.

With the advance made in geology, in late years, the views of

¹ *Reconnaissance of the Gold Fields of the Southern Appalachians*, by George F. Becker, p. 35—Sixteenth Annual Report of the Director, U. S. Geol. Sur.

² *Geology of North Carolina*, Vol. 1, 1875, p. 285.

the best geologists, on this subject, seem to accord with those of Prof. Rogers. Formerly, the schists and gneisses were regarded as metamorphosed sedimentary rocks, and their characteristic markings were considered original lines of stratification; but it is now certain, that many of them were primarily igneous. By no means, should the gneissic and schistose markings in these rocks be confused with the lines of stratification and bedding, exhibited by sedimentary rocks. Still, this very confusion, which has been so common, has given rise to the idea, that the veins, lying between the supposed strata, were themselves deposited as sediments. Such an idea should have no place in the minds of intelligent geologists and mining men, of the present day. It is now well understood, that the markings in the gneisses and schists have been produced by immense pressure, exerted on the rocks, which has brought about a re-arrangement of their constituent minerals, grouping them in generally parallel lines; shearing and elongating crystalline masses; and sometimes changing cleavable feldspathic grains to innumerable individuals, of much smaller dimensions. It is not uncommon, that the metamorphic energy results in chemical, as well as physical changes, producing well crystallized minerals within the schists.

In the formation of the veins in question, which includes those, of like character, in this county, it is evident, that the fissuring was done, subsequent to the shearing of the schists; and it is reasonable, that they should have fractured easiest, along the plane of least cohesion, which is the plane of schistosity. It is not at all surprising, that the fractures did not continue along straight lines, but that, while continuing generally along the plane of easiest cleavage, they broke obliquely across the schistosity, again resuming the direction of easiest cleavage. This would indicate a lateral

stress, oblique to the plane of pressure, which had produced the shearing; resulting in a dislocation of the walls of the fissure and the production of pipes, more or less flat and irregular, with contracted spaces between the walls, which, in places, would rest against each other. The filling in of these spaces by hot water solutions of silica, gold etc. from below, gradually deposited on the walls, would produce "chimneys" connected by narrower portions, thinning out, and at times disappearing entirely. A good illustration of this was seen by me at the Singleton mine. Again, because of the fracturing obliquely across the schists, the irregularities of fissure produce more or less irregular lenses, which are at times of considerable size. This is well shown at the Mary Henry mine, where, when one of the large lenses has been stoped out, another will be found, by following the small connecting vein. Veins of this character often contain considerable mica, all through the quartz. Some of this may have crumbled from the enclosing schists, and fallen into the vein, while forming; but probably, in most cases, it has been caused by the many small, attendant fissures, made when the mass was fractured. Excellent illustration of this is, also, to be seen at the Mary Henry mine.

Besides the more or less disjointed auriferous veins in mica-schist, called stringer leads, by Dr. Becker,¹ there occur in the schists *Well Defined Veins*, some of which are auriferous, while others, if so at all, are of very low grade. Whether or not either class of these veins is younger, than the broken and discontinuous quartz veins of the stringer leads or the auriferous mica-schists, I have not sufficient evidence to establish; but I have no idea, that the coarse, massive, barren veins are contemporaneous with the auriferous veins. I hope to get satisfactory evidence of this, later on.

¹ Loc. cit., p. 300.

Frequently, have I been asked two questions, which are closely akin, and to which I here endeavor to give a brief answer. One of these is "Do you think, these veins are true fissure veins?"; and the other, "Do you think the veins will increase in size, as you go downward on them?".

The first question has been answered, in the foregoing discussion, if we are to understand the term, "true fissure vein," to apply to a fissure in the rocks, resulting from dynamic stress, originating below the solid crust of the earth, which has, later, been filled by continued deposition, from time to time, of mineral matter, from hot water solutions, which, successively filled, and receded from, the fissures, in obedience to subsequent dynamic movements. I believe the auriferous veins of this belt to have been formed in this way.

The second question cannot be so satisfactorily answered. While it naturally suggests itself to us, that the many small veins of a stringer lead should come together in one large vein, deeper down in the earth, still, no case has come under my observation, in Lumpkin county, that would assist in a confirmation of this conjecture.

As bearing on these questions, I can do no better, than quote so good an authority as Dr. Becker, in his discussion, on the auriferous veins in the South: —¹

"The question of the persistency of the veins in depth is one, which, in my opinion, need cause no uneasiness. For reasons, stated elsewhere in this report, it is believed, that the veins date chiefly from a pre-Cambrian period; and, if so, the present croppings are far below the original ones. If mining could be carried to an unlimited depth, it is probable, that the fissures would be found to grow smaller; for the greater the pressure of the superincumbent

¹ Op. cit., pp. 42 and 43.

mass, the greater must have been the tendency to close openings, formed under catastrophic conditions; but the total depth of fissures measured from the original surface is most likely of the same order, as their length, several miles in many cases, while no mine has ever reached a depth of one mile. In sinking, it should not be forgotten, that veins may imbricate in a vertical as well as in a horizontal direction, and that cross-cutting is, therefore, a very essential feature of development.

"It has been held, that the precipitation of gold took place mostly near the original surface;¹ but, if the veins of the Southern Appalachians are, as they seem to me, of pre-Cambrian age, this cannot be strictly true; nor does it seem to me, that the mining operations of the last thirty years point to such a conclusion. Doubtless some veins grow poorer in depth, while some grow richer. These variations, within accessible limits of depth, are controlled, for the most part, by circumstances, similar to those, which bring about variations in tenor, from point to point, on the strike of the veins.

"An idea is very prevalent, among mine owners, that veins may be expected, as a rule, to grow stronger and richer with depth. This is an hypothesis, based on hope, and with no justification in general experience."

In regard to the belts of *Auriferous Mica-schists*, which contain little, if any, quartz, and those, which are in themselves richer than the quartz veins contained, little need be said, further, than to reaffirm, that the theory, suggested by Dr. Becker,² that the gold in these schists, occurring in particles, at times of considerable size, has been left, as a result of the leaching out of the quartz, in which it was originally contained, is the most satisfactory, yet put

¹ Murchison, *Siluria*, 4th ed., 1867, p. 459.

² *Loc. cit.*, p. 280.

forward. The schists of the so-called Yellow belt along Findley Ridge belong to this class, as they are richer in gold, than the included veins.

In auriferous districts, the *Gravel Beds* are usually the first deposits, to give evidence of their auriferous character. Along with the pebbles, the sand and the clay, is found gold, in the form of nuggets,¹ grains and dust. In this county, the gold grains vary from fine to very coarse, and nuggets are said to have been found, weighing as much as 300 pennyweights. A considerable number of nuggets are said to have been found, during the early workings of the deposits, the history of which it is now impossible to get. Comparatively few have been found, since the civil war, as the gravel deposits had been nearly all worked, prior to that event. In the breaking down of the quartz veins, those, that are auriferous, turn loose their gold, in the forms above mentioned; and it is carried down stream, subject to much greater attrition, than the quartz. When broken away from the parent vein, it is usually very rough, with sharp points and crystalline faces; and often with quartz clinging to it, and even enclosed in it; but it soon looses these and is often brightly polished by the attrition. Such are the State Museum nuggets from the Hamby Mountain mine in White county, before referred to.

CHARACTER OF THE ORE

The Character of the Ore in the veins varies in a number of particulars, not only in contrasting one vein with another, but also, the material of a vein with other material from the same vein, both in

¹ This name is given to large masses of gold and other precious metals, found in nature, free, or nearly free, from the vein-stone.

the value, and in the general appearance of the ore. The quartz of the veins varies from milk-white to transparent, sometimes slightly smoky, and from coarse-massive to fine-saccharoidal, crystals being of rare occurrence. Below water-level, the quartz contains the sulphides, pyrite and pyrrhotite (two forms of iron sulphide), **chalcopryite** (an iron-copper sulphide), galena (lead sulphide) and **sphalerite**, (zinc sulphide); other minerals are free gold, **pyromorphite** (lead chloro-phosphate), chlorite (a dark-green hydrous mica), **garnet**, malachite (a hydrous copper carbonate) from the alteration of **chalcopryite**, and sericite, a damourite variety of muscovite, the most common of all the micas. Of the sulphides, only the pyrite is in any abundance, the **chalcopryite** occurring sparsely, and the **pyrrhotite**, galena and **sphalerite** being rare, especially the last. The **pyromorphite** occurs in seams, as green coats on the quartz, sometimes presenting minute hexagonal crystals with the unit pyramid, thoroughly typical of this species. In the veins of the Singleton mine, the occurrence of these green coats is quite common; and Capt. John W. Weaver, a very intelligent and skillful miner, who has been in charge of the mine, for several years, told me, that the finding of these coats was always the forerunner of a good strike of gold, in this mine. Of the remaining minerals, **garnet** and **sericite** are quite common, and chlorite, somewhat so; but **malachite** is rare. **Arsenopyrite**, **allanite**, **apatite**, **calcite**, **ilmenite**, **siderite**, **tetradymite** and **tourmaline** are, also, said to occur; but, if so, they are very rare.

The pyrite occurs in small irregular masses and in crystals, the only two forms of the latter, observed, being the cube (100, *i-i*) and the ordinary combination of this and the tetrahexahedron (210, *i-2*), in which the cube face is generally curved, accompanied by the usual resulting striations, those on adjacent faces, at right

angles to each other, in accordance with the hemihedrism of the tetrahexahedron.

Above water-level, the pyrite has been decomposed, depositing, on the rough walls of the resulting cavities in the quartz, thin coats of limonite (a hydrous iron sesqui-oxide) and included free gold, from the most minute particles to thin crystalline plates, several millimeters across. It is not uncommon, to find a cellular structure in the altered pyrite crystal itself, consisting of very thin plates of hard residual limonite, arranged quite closely together, parallel with the cubic axes, and, generally, equidistant. In other cases, the residual limonite follows no regular order, in its cellular structure, though the interior is frequently partially covered over by minute forms, from botryoidal to stalactitic. It is in this agglomeration, that much of the gold is held in captivity, and is prevented from being washed away, by the flowing and seeping waters, which find their way through rock crevices and cavities. However, most of the cavities, left by the decomposed pyrite, are merely iron-stained, the limonite offering little or no protection to the released gold. Much of this is washed away; some of the more finely divided gold, into the decomposed porous and fissured schists, enclosing the veins, while much the larger part of it is carried, by the waters through fissures and crevices, finding its way into the streams, below, and, ultimately, a lodgment in the gravel deposits. Plates of gold, anchored in the quartz, and extending well into the crystal casts and cavities, left by the pyrite, are not uncommon, in specimens showing free gold. Except in the case of the crystal casts, the cavities in the quartz are exceedingly irregular and jagged, the rock being known as cellular quartz; though, among the miners, it is more commonly called honey-comb quartz. The structure of these veins, while not so strikingly

banded, as the characteristic metalliferous quartz veins of the Western States, is, nevertheless, distinctly banded in most cases, the bands being arranged parallel with the walls of the vein. A specimen before me, from the Singleton mine, consists of alternating bands of saccharoidal quartz and auriferous sulphides, with very thin seams of sericite, parallelly arranged. The auriferous veins are those, composed of the fine saccharoidal quartz with its included minerals, the large veins, with coarse massive quartz, as before stated, usually being of low grade or absolutely barren. One of these may be seen, in the coarse, jointed blocks, near the right hand edge of Plate XIV, a view in the open cut of the Singleton mine. Some of the saccharoidal veins have disintegrated to sand, and are locally known as "sand veins". They do not seem to have lost, in any degree, their value, on this account; for some of them enjoy fine local reputation, as gold-producers.

As before mentioned, some of the veins, enclosed by the schistose saprolite, are not so rich, as the surrounding schists. This seems to be a very well established fact; but, in order to test it, material was selected by me, in the north tunnel of the Crown Mountain property, from which assays were made, with the following results:—

(a) All auriferous quartz veins, Yellow belt, from both walls,
North tunnel..... 0.01 oz. (\$0.21) of gold per ton

(b) Schistose saprolite, from the Yellow belt from both walls in
the North tunnel..... 0.10 oz. (\$2.07) of gold per ton

Here, the schists contain just ten times as much gold, as the included quartz veins. The particles of gold in these decomposed schists are sometimes quite coarse. It is hardly probable, that they could have been washed from the veins far into the schists;

as a matter of fact, this occurrence supports, in no small degree, the theory suggested by Dr. Becker, of subsequent solution, and dissipation of the quartz, leaving only the gold in the schists.¹

The nature of the *Stringer Leads* has been discussed above. The character of the ore varies but little, from that of the well-defined auriferous veins, the quartz being transparent, saccharoidal ; and cellular, stained by limonite above water-level, with free gold, both in the quartz, and in the cavities, but containing auriferous sulphides below water-level. As has been before stated, many of these schistose saprolites contain decomposed garnets in abundance, which are frequently auriferous.

The character of the gold in the *Gravel Beds* has been sufficiently dwelt upon, and nothing further need be said, here, concerning it.

IMPROVEMENTS ON THE MINING PROPERTIES

As has been before stated, the mining, done in Lumpkin county, has been nearly altogether of a surface character ; and the development work, thus far done, would not entitle the best of the mines to be classed as more than good prospects, were they to be judged by this alone ; for such a thing as deep mining has never been attempted in this county. Reasons for this have been given in another part of this report. That there are a considerable number of good prospects, however, and some good mines, will be seen from the special report on each property, which follows, further on. While a considerable number of the mining-plants have been kept

¹ Loc. cit., p. 280.

in good condition, by practically continuous work, confessedly on a small scale, in most cases, however; yet some of the plants have been allowed to go down, to a surprising extent. These would require some outlay, before they could be put to use. The plants consist, usually, of a water-supply ditch, a reservoir for hydraulicking, pipe-lines with hydraulic giants, and a stamp-mill with its accessories; turbine, cascade and overshot water-wheels, or boilers, pumps and engines, constituting a part of the outfit, according to whether water- or steam-power is used.

Following, is a list of the *Stamp-mills* in active operation, during the summer of 1896, with a total of 240 stamps:—

Findley	40 stamps	Yahoola	20 stamps
Hedwig	40 "	Preacher	10 "
Barlow	40 "	Singleton	10 "
Ralston	20 "	Turkey Hill	10 "
Lockhart	20 "	Woodward	5 "
Hand	20 "	Murray	5 "

A Huntington roller-mill, also, was in operation at the Betz mine. Ten mills, with a total of 200 stamps, were idle, as follows:—

Ivey	60 stamps	Siloam	10 stamps
Calhoun	40 "	Lawrence	10 "
Josephine	20 "	Bast.	10 "
Fish Trap	20 "	Stanley	5 "
Garnet	20 "	Horner	5 "


The water-supply comes from the higher altitudes, in the northern part of the county, principally through the *Hand Ditch*. This ditch supplies nearly all the mines and mills, immediately around Dahlonega; and a branch of it runs to the Barlow mine. This ditch takes its water from the head-waters of Yahoola creek, about seven miles north of Dahlonega; but, on account of the many ridges around which it must travel, its course is so sinuous,

that the water travels twenty miles, before it reaches the Hand mine, where it empties into the creek. At Dahlonga, the Barlow branch begins; and, winding its way down to that mine, it finds an outlet in Cane creek. An independent branch, starting on the west side of Dahlonga, was built by the owners of the Findley mine, in order to convey the water from the Hand ditch to that mine. This branch, which is two or three miles long, belongs to Mr. Christian Wahl, President of the Hand and Barlow United Gold Mines and Hydraulic Works of Georgia.

About two miles north of Dahlonga, the water, from the ditch, is conveyed across Yahoola creek, in a 36-inch iron tube, 2,300 feet long. In addition to this, there are 6,455 feet of wooden pipe, of the same kind and size as the above, distributed along the ditch.

The main ditch, including the extension to the Findley mine, is said to have cost about \$300,000, and the Barlow branch, \$20,000 additional. This ditch supplies water to a large number of mines and mills, which is bought, at so much per miner's inch. It is one of the most valuable properties in the county. Its construction was begun, during the first part of the year 1859, by the Yahoola Gold Mining Company, which was represented by Dr. Benj. Hamilton, of North Carolina, and Dr. M. H. Van Dyke, of New York; but it was not completed, until after the close of the war. The ditch was first brought to Wimpy's grist-mill on Yahoola creek; the water was then brought across the creek on a trestle, 150 feet high, and 710 feet long. Beyond the trestle, the ditch is six feet wide at the top, sloping to five feet at the bottom, and is three feet deep. From the trestle to what is now the Hand mine, but which was then known as the Yahoola mine, a temporary ditch was dug, four feet wide at the top, sloping to three feet at the bottom, and two feet deep. The temporary ditch was finished, in the latter part of

1861. After the war, Dr. Van Dyke, who had remained in Dahlonega, all through this period, started up work, and finished the ditch, in full size. It was then known, as the Yahoola ditch; but, soon after it came into the possession of Mr. N. H. Hand, in 1872, the name was changed to *The Hand Ditch*, which name it has since borne. A few years since, it was bought by the Hand and Barlow United Gold Mines and Hydraulic Works of Georgia, of which Mr. Christian Wahl, of Milwaukee, Wis., is president and principal stockholder. It is still the property of this company.

Three smaller ditches are worthy of mention, viz:—*The Singleton Ditch*, which supplies water to the Singleton mine; *The Cane Creek Ditch*, which furnishes it to the Ivey mine; and *The Mill Creek Ditch*, which delivers it, at the Betz mine. These will be described, with  Properties, to which they severally belong.

COLLATERAL RESOURCES

In its *Water Resources*, Lumpkin, as a mining county, is peculiarly fortunate. In its northeastern corner, rises the Chestatee river, with many tributaries, the principal of which are Yahoola and Cane creeks. These rise in the mountains along the north county-line, and flowing south across the gold belt, empty into the river, within the belt. In the northwest part of the county, the Etowah river has its source in abundant mountain streams, with larger tributaries farther south, the most important of which are Nimblewill, Jones and Mill creeks. These two main streams, with their numerous tributaries, will, without doubt, always suffice, for any demand, that may be made upon them, for mining purposes, with-

out materially affecting other legitimate interests. On the larger streams are numbers of shoals, available for water-power, on a large scale ; and many of the smaller streams can be made to contribute, in a lesser degree, to this end.

The abundance of *Timber*, of both soft and hard woods, for *fuel* and for the erection of *buildings* has been discussed in another part of this report,¹ and need not be dwelt upon, here.

The *Soil* is rich and productive; and grain, potatoes, grass and fruits can be raised in abundance. The valley lands are of exceptional value for cultivation, though the hillsides, while fertile, with the loam of ages of decaying vegetation, are often too steep, to admit of profitable tillage.

The *Climate* of Lumpkin county is very healthful, and the temperature is remarkably uniform ; in summer, never registering very high, and in winter, seldom, near the zero point. It is protected from the severity of the northwest winds of winter, by the Blue Ridge, which rises high on its north and northwest boundaries; and, in summer, the cool south breezes from the sea reach its high altitudes. Mining operations are carried on, all the year round, without danger of severe exposure.

Labor for mining purposes can be had, for from 80 cents to \$1.00 a day, for the ordinary mining hand ; while mine superintendents, who have had long experience in the mines, are to be had, for \$2.50 a day. The ordinary miners are from both the white and negro races ; but they work peaceably together ; and no strikes, boycotts or collusions of any sort have ever been attempted.

¹ See page 277.

METHODS OF MINING

In the earlier days of the gold industry in Lumpkin county, the gold pan, the "long-tom" and the gum "rocker," with the pick and shovel, constituted the miner's outfit; and, even in this day, instances can be cited, where the "tom" and the "rocker" are used by tributers. The old Mexican arrastre was probably the first mill used; and, later, the wooden-stamp mill. This was succeeded by the present iron-stamp mill, with steel shoes and mortars. In the past, the weight of the stamps has been 450 pounds, though there is some tendency, now, to increase the weight. Two mills in the county are supplied with 650-pound stamps, and one, with 850; the others have 450-pound stamps.

In the operation of these mills, both water- and steam-power are in use. Steam-pumps are used, at some of the mines, for raising water to the reservoirs, located on the hill-tops, for hydraulic mining; less often, for keeping shafts free from water. In mines, worked on very small capital, hand-pumps have been resorted to, when the water became troublesome; and, when the column of water became too heavy, to be lifted by hand, shafts, with a good average sulphide ore at their bottom, have been abandoned, because of the inability of the miners, to afford the expense of putting in steam-pumps.

Where saprolite deposits are being worked by open cut, pipelines are run from the water-supply to the reservoirs, or to hydraulic giants in the cuts. A brief description of this may be of interest. While the reservoir is being filled from the pump-house, men are set to work in the open cut, with picks, to dig out the soft, auriferous saprolite, and to break up any large masses of quartz,

that may be encountered, leaving the material where the waters will have free access to it. Generally, two runs, a day, from the reservoirs, are made, at stated hours. When the hour arrives, the workmen leave the cut, stationing themselves along the flume, to prevent its being clogged up by fragments of quartz, and clods, which the water has failed to reduce. One of their number then goes up to the reservoir, and opens the gate, when the water pours out, in torrents, down over the loosened saprolite, mixing with it, till it forms a thick, slimy mud, of the consistency of fresh mortar; this is gradually thinned down, by the rushing waters, and is carried, with the angular blocks of quartz and harder saprolite, through the flume to the mill. During one of these runs, I have seen blocks of saprolite, 12 x 8 x 5 inches carried, by the torrent, down the slightly slanting cut, with little resistance. To assist in liquefying this flow of mud, a hydraulic giant is, sometimes, placed in the lower part of the cut, so as to play upon it; but this helps only a little; for the water, heavily charged with solid matter, rushes down the flume, through the sluices, and into the ore-bin in the mill, where it deposits the coarser material, such as sand and blocks of saprolite and quartz, while the muddy water, containing a large part of the gold, passes through the racks, out of the mill, and into the nearest stream.

The material, which has been left in the ore-bin, is fed, by hand, into the stamp-mill, and the gold is caught on the amalgamated copper plates, which vary, in length, from four to twelve feet. Short riffle-boxes, containing mercury, are placed in connection with these plates, at their lower end, to catch such of the gold, as may pass, with the tailings, over the plates; though it is known to be true, that gold, coated by limonite ("rusty gold") will not amalgamate; and such of it, as is not caught by the riffles, must be lost.

One cannot repress astonishment, that so wasteful a system

could have been in such general use, for so long a time, especially as the ores are, for the most part, of low grade; though it is argued, in its favor, that this method of mining the saprolites carries with it the minimum of expense.

While some of the gold, liberated, by the disintegration of the auriferous saprolite by the waters, is caught up by the riffles in the sluices, and another part finds lodgment in the ore-pile in the mill-house, still it is said, and it is currently believed, that, from 25 to 50 per cent. of it is lost, being held up by the solid matter in the swiftly running waters, eventually passing through the racks of the ore-bin, and out of the mill-house, before it is deposited. I am reliably informed, that gold, passing through the Preacher mill, in this way, is found all along the bed of the Tan-yard branch, from the mill to the creek, a distance of one mile.

Still, this system of mining is so inexpensive, and brings such fair results, that it is only recently, that steps have been taken, looking toward the saving of more gold. Settling-bins and other devices, for saving the small particles of gold, heretofore lost, are now coming into use; and it is to be hoped, that some method may soon be devised, that will ultimate in the saving of practically all the gold. Without doubt, such a process, with proper economy in handling, would place these ores on the list of superior investment.

Among the apparatus, used in mining operations in Lumpkin county, is the *Hydraulic Giant*, which is employed principally, and most effectively, on the decomposed auriferous mica-schists, and, to a limited extent, on such of the gravel deposits, as are still worked. It is believed, that the use of this piece of apparatus, in re-working all the old auriferous gravel beds in the county, would pay

well, even in the case of those, that have been worked over by the old, crude methods, two or three times.

The Hydraulic Gravel-elevator has, lately, been used very successfully, in mining gravel beds, which have no natural drainage ; and it is still in use, where such condition exists.

In the Chestatee river, *Steam Dredge-boats* have been used, during the last several years, with abundant success, in recovering sedimentary gold, from the bed of the stream. The auriferous sand, pebbles and bowlders are taken from the bottom of the river by the dredge-buckets, which are emptied into a line of sluices, sixty to seventy feet long, charged with mercury, through which the auriferous material is washed.

MINT STATISTICS OF LUMPKIN COUNTY

The following statistics of the gold production of Lumpkin county, 1880-95 inclusive, are from reports and estimates, as given in the annual reports of the Director of the Mint: —

1880	\$ 96,880
1881	88,000
1882	225,000
1883	122,500
1884	89,500
1885	79,876
1886	60,000
1887	47,500
1888	43,275
1889	42,246
Forwarded.	\$ 894,777

Brought forward	\$ 894,777
1890	40,652
1891	40,450
1892	41,666
1893	36,493
1894	33,551
1895	42,191
Total	<u>\$1,129,780</u>

The only year within this period, in which any considerable activity was shown, is indicated in the list above. From my personal examination of its various gold properties, there seems to be no reason, why the gold production of this county should not be made to far exceed any yield, in this list.

ADDENDUM

Since writing that part of this report, which relates to the general geology of the gold belt of Lumpkin county, a number of rocks, collected by me, in the field, have been submitted to microscopic study; and I am indebted to my assistant, Dr. Thomas L. Watson, for the report, which follows, below.

From a megascopic study, I had believed the hornblende-schists to be epidiorite; and this accounts for its being mentioned as "Diorite", on Plate XV, the error being discovered, after the plates were printed.

A PRELIMINARY PETROGRAPHIC REPORT ON SOME
METAMORPHIC ROCKS IN AND AROUND DAHLONEGA,
LUMPKIN COUNTY, GEORGIA

BY THOMAS L. WATSON, ASSISTANT GEOLOGIST

The rocks, examined, comprise thirteen specimens, which were, in great part, collected by the State Geologist, Prof. W. S. Yeates, during the season of 1896, and recently submitted to me for a microscopic examination.

The notes, which follow, represent, at best, a brief examination; and the names, given to the various rocks, must be regarded as more or less tentative, until a thorough petrographic examination and chemical analyses can be made, when definite classification and grouping may be permanently effected.

The specimens studied, are, almost without exception, characterized, first, by a great paucity of feldspar, which, with one or two exceptions, is entirely absent; second, by the essential minerals being hornblende or mica, or both, with quartz; and, third, by the structure being prevailingly schistose. The above features place the rocks among the crystalline schists; but what they were originally, whether metamorphosed sediments or eruptives, sufficient evidence has not been brought forward to determine, from the microscopic study given them. However, from the field evidence, it is believed, that systematic and thorough study will prove, that a portion of them, at least, represent phases of some of the basic eruptives, such as diorite, etc.

The material has been more or less badly weathered, a feature, which has rendered its study very much less satisfactory, than it

would have been, otherwise. The extent, to which rock decay from atmospheric agencies has been carried forward, among the old crystalline rocks of Georgia, renders it exceedingly difficult, and in most cases, almost impossible, to obtain perfectly fresh specimens for study.

I have grouped all the rocks under the general heading, schists, which must be accepted in its relative sense only, since all the rocks in the region are laminated. A further division is, into basic and acid schists. It, at once, becomes apparent, that the division into basic and acid schists cannot be absolutely fixed, until chemical analyses are made; hence, it may be found, that some changes will be necessary, after a thorough chemical study of them has been completed. Furthermore, the rocks are all characterized by an abundance of free quartz. In most cases, it has been impossible to say, how much of this mineral is primary, and how much, secondary. However, it is fairly certain, that, in some of the sections, two generations of quartz were recognized, which would determine a part of it, as being formed, subsequent to the deformation of the rock, and, therefore, secondary in origin.

In nearly every case, the quartz is distinctly granular, and shows no tendency toward orientation, whatsoever; and, so far as can be made out, no cataclastic structure is shown. Just how far the above may be taken as evidence, pointing to the secondary origin of this constituent, cannot, at present, be stated.

The region, in which the specimens were collected, is a part of one of the oldest crystalline rock areas, found in the State. The relative age of this area, and the deformations, through which it has passed, render the rocks of doubtful and unknown origin.

SCHISTS

ACID ROCKS

No. D. Locality — The bottom of the 80-foot shaft in the Findley mine.

QUARTZ SCHIST. — Megascopically, this is a very compact, fine-grained, quartzitic rock, dark-gray in color, and containing thin layers of biotite, chlorite and garnets. These layers are very irregular, in some cases, reaching a considerable thickness, and assuming, more or less, the form of lenticular masses.

The rock is finely laminated, which, when viewed in other directions, appears perfectly massive, closely resembling a quartzite. Quartz, biotite, garnet and pyrite are clearly visible to the unaided eye.

Microscopically, the rock has a granular structure, with the mineral constituents all allotriomorphic. The following minerals have been recognized, in order of their abundance: — Quartz, biotite, garnet and pyrite. The main mass of the rock is made up of interlocking quartz grains. The garnets occur (1) segregated into layers, intimately associated with the mica, which forms the dark-colored, thin bands running through the rock; and (2) distributed through the ground mass of quartz, as large and irregular crystals, very much distorted, due, presumably, to the intense pressure, to which the rock has been subjected. The mica has suffered considerable alteration — in fact, the greater part of it — into a reddish-brown product, taken to be chlorite.

The rock represents the so-called "black belt" along the Findley Ridge, the weathered product of which is a slightly rusty-colored siliceous sand, through which can be seen, distributed more or less

abundantly, folia of mica. Judging from the decayed product, the "black belt" varies considerably, according to locality, in mineral composition. The weathered product is often a mottled clay, the coloring of which, in some localities, is largely due to manganese.

BASIC ROCKS

Under this heading, I have grouped all those rocks, whose mineral composition is made up, in large part, of one or more of the ferro-magnesian silicates. In the majority of them, however, there is, apparently, an abnormally large percentage of quartz.

No. 2. Locality — The flume cut, Singleton mine.

HORNBLLENDE-MICA SCHIST. — Megascopically, this is a highly schistose rock, made up of alternating white and black bands. The white layers consist almost wholly of quartz, while the dark-colored bands are composed of a copper-colored mica and green hornblende.

A microscopic examination shows the rock to consist essentially of green hornblende, mica and quartz. A large amount of secondary calcite is present, with a slight sprinkling of small, irregular grains of magnetite and epidote. The hornblende has suffered more or less alteration to chlorite. The hornblende occurs in deformed crystals, often, in part, prismatic; while the mica is prevailingly made up of fibrous, prismatic shreds. The two are very intimately associated, and are orientated in the direction of their longer diameters. An original granular structure is indicated for the rock, with an induced secondary banded or schistose structure, whereby a segregation of the basic minerals into bands has taken place.

The rock has been badly altered, consisting largely in the hornblende having changed to calcite, the latter occurring pseudomorphic after the hornblende. The polysynthetic twinning and Newton's colors, along the cleavage cracks, in some of the calcite crystals, are very characteristic.

No. 3. Locality — The hanging wall in the Singleton cut, Singleton mine.

BIOTITE-EPIDOTE SCHIST. — Megascopically, this is a compact, fine-grained and finely laminated rock, of a light-gray color. Biotite, muscovite and a few scattering garnets are the only minerals, that can be definitely identified, by the unaided eye.

Under the microscope, the rock is shown to be composed, essentially, of mica, epidote and quartz. A large quantity, of what is taken to be magnetite, is found scattered throughout the section, in the form of small and elongated crystals. The mica plates are drawn out in the direction of their longer diameters, and are approximately parallel with each other. The alteration, in some cases, of the mica to chlorite, is noticed.

The quartz occurs as distinct grains, without definite crystal outline. A rather large quantity of epidote is seen, which occurs in somewhat large crystals of indefinite shape. The pleochroism, which varies from a very light, delicate green to a decided bright, brownish-yellow, is very marked. This mineral is, in part, associated with the mica, and is not infrequently seen, drawn out, in the same direction, and parallel to the mica plates. No garnets are visible in the thin section; but they can be seen, sparingly distributed through the hand specimen.

No. 4. Locality — The dump-pile of the Moore and Cannon cut, Singleton mine.

QUARTZ AMPHIBOLITE (*Hornblende-Schist*). — This is a rather coarse-grained, dark-colored, speckled rock, with a decided schistose structure, when viewed from one side. Otherwise, it appears to be perfectly massive. Hornblende, quartz and pyrite are discernible, megascopically; the pyrite, however, only in occasional small particles.

Microscopically, the rock is composed principally of common green hornblende, quartz and epidote, with some pyrite and calcite. The hornblende is mostly prismatic and fibrous in outline, although allotriomorphic grains occur, in which both cleavages are well developed. The epidote occurs in irregular small grains, scattered through the interlocking quartz grains.

No. 8: Locality — The Knight cut, Hand mine.

GARNETIFEROUS MICA (*Biotite*) SCHIST. — Megascopically, this is a very finely laminated, light-gray colored, homogeneous rock, in which mica and garnets are the only visible minerals.

Microscopical examination shows the rock to be composed, essentially, of biotite, quartz and garnet. Magnetite and epidote occur, as accessory minerals.

The quartz shows a decided tendency to orientation, in one direction. The biotite occurs in unusually long and drawn-out shreds, arranged parallel to one another, in the direction of their longer diameters. The alteration, to a certain extent, of the biotite to chlorite, is noticed.

No. 10. Locality — Middle Gainesville road, on the south side of Findley Ridge, Lumpkin county.

HORNBLLENDE-MICA (*Biotite*) SCHIST. — Megascopically, the rock is fine-grained and decidedly dark-gray in color, with a marked *is* stose structure. Quartz, mica, hornblende and some calcite are recognizable.

A microscopic study indicates the presence of the essential minerals, quartz, hornblende and mica; and, as secondary minerals, resulting from alteration, calcite and chlorite. Also, a large quantity of accessory magnetite occurs, in irregularly defined grains, of rather large size. The mica is more abundant, in the rock, than the hornblende, and is present mostly in the form of some-

what short prismatic plates, scattered throughout the section, without any apparent orientation. The hornblende forms large and distinct grains, without definite crystal outline, but having, generally, the two cleavages well developed. Quartz is the most abundant mineral in the rock, occurring in distinctly granular masses. It can be stated, with a reasonable degree of certainty, that the original structure of the rock was granular, since there is but slight tendency towards segregation of the minerals into layers, which is only recognizable in the hand specimen.

No. 13. Locality — Lot 1,051, Dahlonga ; ridge south of the Hand mind.

AMPHIBOLITE (*Hornblende-Schist*). — The hand specimen reveals a fine-grained, homogeneous rock, of a dark color, with a decided greenish cast. The structure shows it to be a finely banded schist. The early weathering is into long, prismatic blocks.

Microscopically, the rock is composed, essentially, of common green hornblende, with a considerable sprinkling of quartz, which has not been definitely identified, as primary or secondary. Epidote is scattered through the rock, in small, irregular-shaped grains. Considerably more than half of the rock-mass is made up of hornblende, which occurs as allotriomorphic grains and fibrous, prismatic crystals, grouped more or less together in an interlocking manner. The pleochroism is very marked, showing the usual absorption, *a* — yellow, *b* — greenish yellow, *c* — bluish green. The maximum extinction angle of a number of pieces, measured against the prismatic cleavage, was from 18° — 20° . No orientation of the hornblende crystals could be made out.

The epidote is intimately associated with the hornblende, generally filling the interstitial spaces. The quartz is distributed throughout the rock mass, as irregular grains.

No. 27. Locality — An exposure along the road, at the Hand mine.

MICA (*Muscovite-Biotite*) SCHIST. — Megascopically, the rock is medium-grained, very light-colored, and rather finely banded. Quartz, muscovite and biotite are visible.

Microscopically, the rock consists essentially of quartz, biotite and muscovite. Some feldspar, more or less altered, with numerous small grains of epidote, are found scattered through the section.

The two micas are intimately associated, and are present, in about equal proportions. Both are drawn out into long, narrow strips, which are grouped into layers, arranged in the direction of their longer diameters. The greater part of the rock is made up of quartz, which forms irregular-shaped grains.

No. 28. Locality — The Hand mine.

AMPHIBOLITE (*Hornblende-Schist*). — Megascopically, this is a fine-grained, schistose rock, of a very dark color, with a slightly greenish cast. The specimen has been very badly weathered, indicated, chiefly, in its highly pitted surface, with the cavities partially filled with bright-colored sesqui-oxide of iron.

When studied, in thin section, it is seen to be composed of the essential minerals, common green hornblende, which makes up the greater bulk of the rock, and quartz. Large quantities of magnetite, with indefinite crystal outline, and some epidote, are present in the section. The magnetite has, in some cases, been decomposed into the hydrous sesqui-oxide of iron.

The hornblende consists of irregularly shaped crystals, with distinct cleavage, and a fibrous, prismatic form, showing definite orientation. Both forms of the hornblende show absorption. A large number of the hornblende crystals gave a medium extinction angle of 14° , measured against the prismatic cleavage. The quartz is

distributed through the hornblende, in the form of indefinitely shaped crystals.

No. 31. Locality — The Hand Mine.

QUARTZ AMPHIBOLITE (*Hornblende-Schist*). — Megascopically, this is an exceedingly finely laminated and compact aphanitic rock, of a dark-gray color, in which none of the minerals can be definitely identified.

A microscopic study reveals an admixture of very fine-grain hornblende and quartz, through which are distributed irregularly shaped masses of magnetite. A large proportion of the magnetites are very much exaggerated in elongation, in one direction. A few scattered grains of epidote were identified. More than half of the rock-mass is composed of hornblende, which occurs in the form of minute deformed grains and prismatic crystals, with orientation quite distinct.

No. 33. Locality — The dump-pile of the Moore and Cannon cut, Singleton mine.

QUARTZ AMPHIBOLITE (*Hornblende-Schist*). — Macroscopically, this is a very compact, dark-colored, schistose rock. The dark hornblende layers alternate, with those of the light-colored quartz. The specimen is badly weathered, principally in the way of minute spots of bright-colored sesqui-oxide of iron, imparting the appearance of a pitted and speckled condition to the rock.

In thin section, the rock is shown to be made up principally of green hornblende, which constitutes more than one-half of the entire rock, and through which are distributed irregular grains of magnetite and layers of interlocking grains of quartz. A slight sprinkling of feldspar, with small crystals of epidote, was observed. The hornblende occurs, chiefly, in the form of long-drawn-out, prismatic fibres, orientated in one direction. Also, allotriomorphic

grains are frequent, with good cleavage development. The absorption for the hornblende is very strong. The spots of iron stain, mentioned above, are apparently due to the oxidation of the magnetite. The quartz forms a mosaic of interlocking grains, arranged in layers, which alternate with the hornblende. No clew is offered, suggesting what the original rock may have been ; but probably, it represents a phase of one of the basic eruptives, such as diorite or, possibly, diabase.

No. E. Locality — Tunnel, E — H,¹ Singleton mine.

AMPHIBOLITE (*Hornblende-Schist*). — Megascopically, a very compact, homogeneous, coarse-grained rock, very dark in color, and having a decided greenish cast. A strong tendency towards a schistose structure is shown in one direction. In others, the rock appears to be distinctly massive. Hornblende, quartz and pyrite can be identified.

Microscopically, the rock is composed essentially of common green hornblende and quartz, with some pyrite and magnetite, and a considerable quantity of secondary calcite. Also, a few grains of plagioclase feldspar were observed.

The hornblende is present, mostly in the form of irregular prismatic masses, without cleavage. However, the irregular, granular form is not uncommon, with one of the cleavages more strongly developed, than the other. It is strongly pleochroic. A very marked feature of the hornblende is its alteration. Evidently, its original form was granular ; but it has, subsequently, altered to the fibrous, prismatic form, in which the cleavage is mostly destroyed. The crystals are further characterized, by not being continuous, but rather in disconnected, shredded masses. The shredded fragments are distributed through large, irregular-shaped crystals of calcite,

¹ See fig. 29.

which preserves, to a marked degree, the outline of the hornblende crystal, from which the calcite is a derived, secondary product. This alteration has advanced to such a degree, that, in some cases, almost the entire hornblende crystal has been changed, only a few shreds of the hornblende being left distributed through the calcite. It is estimated, that at least 5 per cent. of the rock is calcite.

The quartz forms a mosaic of interlocking grains, distributed, in part, through the other minerals.

No. F. Locality — Bed of the stream, adjacent to the Dahlonega and Hand mine road, near the Hand mill.

QUARTZ AMPHIBOLITE (*Hornblende-Schist*).— This is a homogeneous, coarse, granular, dark-colored rock, with some white material, regularly scattered through the mass. Hornblende, some mica, quartz and calcite are recognizable, megascopically.

The microscope reveals the presence of common green hornblende, mica, quartz, plagioclase feldspar, epidote, pyrite, magnetite and considerable secondary calcite. The hornblende occurs in the form of fibrous prismatic crystals, which, for the most part, are interlocking. The absorption is fairly strong. The hornblende, in this specimen, as in No. E., has been changed, in part, to calcite, which now fills the spaces, once occupied by the hornblende.

The feldspar is not, by any means, so abundant, as would be expected. It occurs in irregular grains, more or less rounded, with the zonal structure but meagerly developed. Some grains are sufficiently characterized, however, to enable them to be identified as plagioclase. The quartz occurs as irregular interlocking grains. While the specimen is badly altered, indications are, that it is a phase of a once existing diorite. The rock shows a marked schistosity in the field.

THE CROWN MOUNTAIN PROPERTY

The highest point of Findley Ridge, which is near its center, half-a-mile due south from the court-house in Dahlonega, is known as Crown Mountain. The northern part of the Fish Trap mine, that part, which has been worked for the gold contained in its saprolite and quartz veins, lies well down the mountain's south side; but most of the mountain is included in *lot 947, 12th district*. This lot, with 948, immediately north of it, 989, diagonally adjacent on the southeast, a ten-acre strip from the west side of 987, and one acre from the southeast corner of 986, comprise what is known as THE CROWN MOUNTAIN PROPERTY, owned by Judge W. W. Murray, of the United States Court of Land Claims, whose residence is Huntingdon, Tenn.

Crown Mountain has an altitude of 275 feet above the public square in Dahlonega, and 250 feet above a well-known spring at its base. Its altitude above sea-level is 1,754 feet. It consists principally of the mica-schists of the so-called Yellow and Black belts; but the schists, of what is known as the Fish Trap belt, form a part of its southern side, and the large dike of hornblende-schist, discussed in another part of this report,¹ forms the greater part of its northern side. The dip of the schistosity of all these is from 30° to 50°, usually to the northeast. On the broad oval top of the mountain are to be found small, well-worn boulders and pebbles; and, covering its sides, a bed of clay, described further on. The mountain is well timbered with chestnut, oak and pine, the two former being in much the greater abundance.

Some little prospecting for gold appears to have been done upon

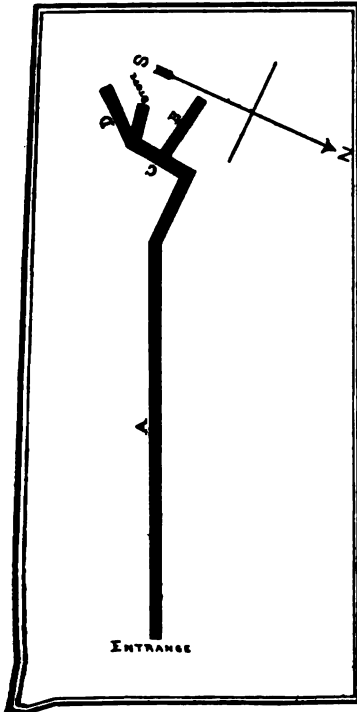
¹ See p. 286.

the Crown Mountain property, years ago, before Judge Murray became its owner ; for, about half-way up the northwest side of the mountain, is what is left of a few old shallow inclines and prospect holes; and, near the top, on the south side, a 30-foot incline was run down on a vein in the "South Black belt," which is said to have yielded good results. The most of the work, however, seems to have been done on a large white quartz vein on the northwest side, which is said to have proved of low grade. As a gold prospect, the property had little reputation, before Judge Murray began prospecting it, in a systematic way, some two or three years ago. Its real value, probably, has not been shown, even by the work, done by this gentleman; for it has been confined to the top of the mountain, no tunnel having, as yet, been driven, down near its base, to expose the character of the deposits deeper down; though Judge Murray has this in view. Under his direction, three tunnels, over 200 feet long, with drifts, have been excavated, one each, into the north, south and east sides of the mountain, at varying elevations near the top, for the purpose of ascertaining the auriferous character of the schistose saprolites and the veins encountered. These tunnels are known, respectively, as the East, South and North Tunnels. In addition to these, a few prospecting pits have been dug, here and there, and a shallow incline has been sunk on a small, but rich, vein near the north tunnel.

THE TUNNELS¹

The entrance to the EAST TUNNEL is along the roadside, on the east flank of that part of Crown Mountain, which rises above the

FIG. 22



Linear View of the East Tunnel,
Crown Mountain Gold Property.
Length $\times \frac{1}{800}$.

top of the ridge, and is about eighty feet below the apex of the mountain, and on a level with the crest of that part of the ridge, lying east of it. It is driven 165 feet, in a direction, S. 65° W., through a deposit of transported clay and the underlying decomposed mica- and hornblende-schists of the "Yellow belt"; from this point, running directly west, for thirty feet, into the slates of the "Black belt", when it turns sharply towards the south, running S. 5° W., for 25 feet; then S. 40° W., for 24 feet, which, with drift B, makes a total of 270 feet. Fig. 22 is a linear representation of the length and direction of this tunnel, reduced to scale.

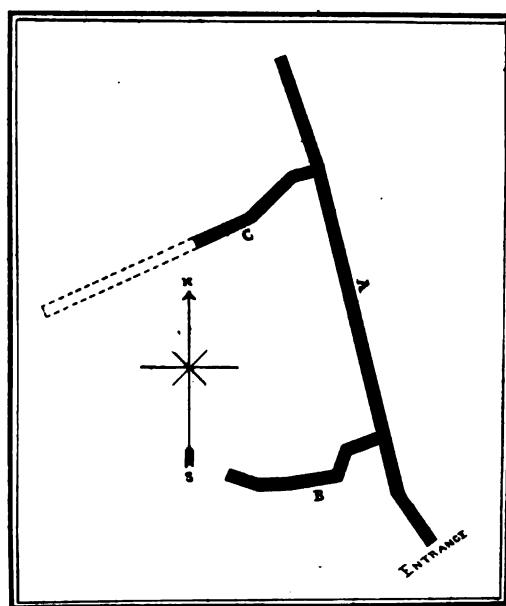
The entrance to the SOUTH TUNNEL is about 65 yards, S. 45° W., from that of the east tunnel, and about 45 feet above the latter, in elevation. It is

driven, at an average angle of N. 20° W., through the deposit of clay, a belt of the yellow decomposed schists, and into a belt

¹ For convenience of description, I have designated the tunnels, with their drifts, by the letters A, B and C, as may be seen by reference to figs. 22, 23 and 24.

of the black slates, a total of 213 feet. At the point of contact between the clay and the yellow schistose saprolite, a drift¹ has been excavated, in a general direction of about S. 70° W., for a total distance of 68 feet, through the clay and the yellow schists, and into a belt of the black slates, known, locally, as the "*South Black Belt*", that, lying at the other end of the main tunnel, being distinguished, as the "*North Black Belt*".

FIG. 23



Linear View of the South Tunnel, Crown Mountain Gold Property. Dotted Lines Indicate the Part Now Filled. Length $\times \frac{1}{8}$.

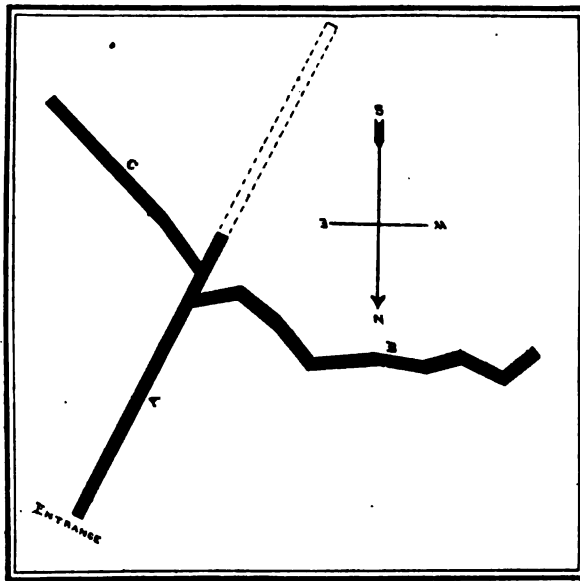
In the rear end of the main tunnel, a few feet within the north black belt, and 164 feet from the entrance to the tunnel, is a second drift,² which has a general direction of S. 60° W., for a

¹ Marked B, fig. 23.

² Marked C, fig. 23.

distance of about 128 feet, of which approximately 70 feet have been filled up with refuse. This drift runs from the north black belt back into the saprolite of the yellow belt. At a distance of fifteen feet beyond the first bend in drift C, an incline 25 feet in length has been sunk on a large quartz vein, lying between the yellow and black belts, and dipping with them to the northeast.

FIG. 24



Linear View of the North Tunnel, Crown Mountain Gold Property. Dotted Lines Indicate the Part now Filled. Length $\times \frac{1}{8}$.

The total number of feet driven in this tunnel is about 410. Fig. 23 is a linear view of this tunnel, reduced to scale, except as to width, which, as is the case with the other tunnels, is three feet.

From the entrance to the South tunnel to the entrance of the NORTH TUNNEL, in a line, N. 30° W., is a distance of about 160 yards; and the elevation of the latter above the former is about 5

feet. The total number of feet driven in this tunnel, including its two lateral drifts and an approximation of 100 feet of the main tunnel, which is filled with refuse, is 486 feet, of which 235 feet constitute the main tunnel. Drift B, running generally west,¹ is 155 feet long, while drift C runs 97 feet almost due southeast. As in the other tunnels, the clay forms the outside part; but, instead of the yellow schists, as in the other tunnels, a decomposed apophysis from the large hornblende dike, farther down the north side, lies in contact with the clay; it was evidently exposed at this point, when the clay was deposited.

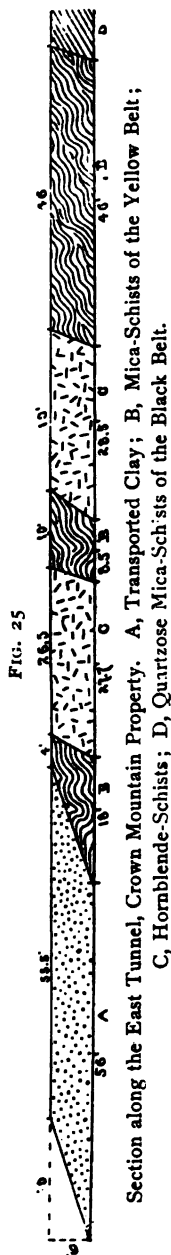
THE ROCKS AND ORES

The rocks, cut by the three tunnels and their drifts, are typical of Findley Ridge; and, as such, their occurrence will be described somewhat in detail, notwithstanding they have been generically described, in another division of this chapter.

A section along the south wall of the east tunnel, indicated in fig. 21, by the letter A, is represented in fig. 25, showing the relative positions and extent of the various rocks, cut in this tunnel.

The TRANSPORTED CLAY lies unconformably on a former surface of the mountain, as indicated by the lines of contact with the underlying rocks in the three tunnels, the lines converging toward the apex of the mountain, though the usual irregularities of a hill-side, resulting from rain sculpture, are, here, quite as pronounced as elsewhere. The thickness of the deposit, cut by the three tunnels,

¹ See fig. 24.



is as follows : — East tunnel, 56 feet ; south tunnel, 48 feet ; north tunnel, 50 feet.

As has been stated, before, neither veins nor pebbles were seen in the clay ; nor were shells, wood or other organic remains observed — only the scant stratum of small angular quartz fragments near the contact with the schists, mentioned before. As has been stated, that part of the clay, lying next to the schists, is of a bright yellow, overlaid by the brownish-red clay, into which it gradually merges. The deposit is compact and apparently homogeneous; and, with the exception of the stratum of angular quartz fragments, is without lines of stratification. There is no material difference in the character of this clay, as it occurs in each of the three tunnels ; its thickness is practically the same, presumably, all around the mountain, except where it has been eroded by rain-water. Assays¹ of this clay from samples taken by me, from each of the three tunnels, show, that it contains a little gold, as follows:—

No. 1	----	0.020	oz.	(\$0.41)	of gold per ton
No. 2	----	0.020	"	(\$0.41)	" " " "
No. 3	----	0.010	"	(\$0.21)	" " " "
No. 4	----	0.025	"	(\$0.52)	" " " "

No. 1 was from the red transported clay in the east tunnel ; No. 2 was from the underlying yellow transported clay in the same tunnel ; No. 3 was from the transported clay in the south tunnel, with-

¹ The assays of the ores from this county, presented in this report, with a few exceptions, which will be noted, were made for me, by THE N. P. PRATT CHEMICAL LABORATORY OF ATLANTA, from material, selected in the field by myself and my assistant.

MINERAL COUNTY

the yellow belt of No. 4 was from the same clay in the north tunnel.

From sections 1 and 2 we may infer, that there is practically no difference in the microscopic character of the yellow clay, which lies between the schists and the overlying red clay.

On examining this property, I had an expert miner pan the clay as it was exposed in the east tunnel, except in the black belt. The only particles of the clay, taken by me from various places, were two coarse particles of gold.

The **YELLOW BELT** consist of a yellow saprolite of various shades of gray and black; and they show little variation in the three tunnels, except near the contact with the hornblende schist where the material is more coarsely crystalline. In the north tunnel, the thickness of these schists, in the direction of the dip, is about 70 feet, trisected by the two apophyses of decomposed hornblende schist, already referred to; the south tunnel is about 100 feet of the yellow schists, approximately along the dip. In the north tunnel, drift B is run along the contact between the yellow and black belts, for nearly its entire distance. A little of the yellow belt, in the north tunnel, proper, is exposed, but, with the exception of a few feet of the black belt, at the end of drift C, and an apophysis of decomposed hornblende schist, 17 feet thick, the entire drift is through the yellow schists.

In the east tunnel, the dip of the schistosity of the yellow belt was 35° to the northeast, with a strike N. 65° W. The black belt overlies the black belt, which is cut, in the rear of the yellow belt. Near the point of contact between the yellow and black belts, the former are highly garnetiferous. The dip and strike of the schists, in the north tunnel, are the same, as in the

MINERAL COUNTY

east tunnel. These schists include numerous quartz veins, usually from an eighth of an inch to eight inches in thickness, averaging, probably, three or four inches; but much larger veins are sometimes met with. Where the veins are of any size, the quartz is generally badly fractured, angular blocks resulting; and these are often black with a coating of manganese di-oxide, concentrated from the decomposition of the original surrounding schists. The larger veins are often ragged in outline, and, sometimes, include fragments of schist. A 30-inch vein in the east tunnel is of this description. This vein is said to pan very little gold. Ordinarily the veins lie between the schists, having the same strike and dip; but veins, with their trend across the schistosity, were noted. The character of the quartz is from fine- to coarse-saccharoidal, and from translucent gray to white in color, with little or no stain of iron oxide. Certain veins, pointed out to me as "sand veins", I found to consist of quartz sand, resulting from the disintegration of fine-grained saccharoidal quartz. Samples taken by me from the yellow belts of the three tunnels, yielded assay results, as follows: —

No. 5	-----	0.015 oz.	(\$0.31)	of gold per ton
" 6	-----	0.040 "	(\$0.83)	" " " "
" 7	-----	0.015 "	(\$0.31)	" " " "
" 8	-----	0.100 "	(\$2.07)	" " " "
" 9	-----	0.010 "	(\$0.21)	" " " "

No. 5 was taken from the yellow decomposed schists of the east tunnel, and contained several small quartz veins, from an eighth to a half-inch thick; No. 6, from the east and south tunnels, was taken from small quartz veins in the yellow schists, from $\frac{3}{4}$ of an inch to 4 inches thick, and included a small quantity of the decom-

posed schists, lying next to the veins ; No. 7 was taken from the yellow decomposed schists in the south tunnel ; No. 8 was from the yellow schists of the north tunnel, including no quartz veins ; and No. 9, from all the veins in these schists, in this tunnel.

Panning Tests of these schists in the east tunnel were made, during my examination of the property. A panful of the schist, containing as little quartz as possible, yielded fairly good results, in several particles of gold. A panful of the small quartz veins from the schist, including a small part of the immediately adjacent schist, was then panned ; and, to my surprise, the result obtained was much inferior to that of the sample, from the surrounding schists.

It is generally conceded, in the Dahlonega district, that the soft ore, of the yellow decomposed schists, and the clay, along Findley Ridge, can be mined and milled, for from 12 to 15 cents per ton, by the hydraulic process. It is apparent, therefore, from the foregoing assays, that, with the immense bodies of this ore on Crown Mountain, profitable mining can be carried on, in working these deposits alone ; and the value of this work is increased, by including the richer veins of the black belts,¹ which are always worked in conjunction with the yellow belts.

The veins of the BLACK BELTS appear to be the best gold producers along Findley Ridge. In the assay results from the Crown Mountain property, this is at once suggested.

As may be seen from fig. 25, the black slates in the east tunnel are cut only in the rear end. Drifts C and D are run along the line of contact between a black and an overlying yellow belt. In this tunnel, the black slates are gneissoid in structure, the layers of mineral residuum being arranged in straight, parallel bands, the rich reds and browns with black, and mixed tints of these, pre-

¹ See assays 10, 11 and 12.

dominating, though white, pale-yellow and gray add greatly to the fascinating coloring in these saprolites.

Beginning at the mouth of drift C in the east tunnel, the black schists constitute most of the west wall of the drift, which is six feet in height, the overlying yellow schists showing only a few inches at the top, while, on the east wall, just three feet away, the black schists do not reach higher than two and a half feet. The dip here is about 50° to the southeast, with a strike in the neighborhood of N. 40° E. Gradually the black slates lower on the west wall, until, at the south side of the stope, designated in fig. 22, their top is only one foot from the floor. From this point, the black slates rise at an angle of 25° , along the wall; and, a few feet further, they disappear entirely. This is, doubtless, the south limit of this one of the black belts, and is identical, with the south edge of the north black belt in the south tunnel.

At fourteen feet from the entrance to drift C, is a drift into the black slates, for 29 feet, in a direction N. 80° W., designated in the figure as B. This drift cuts a very rich small vein at its mouth, and, farther back, two very badly fractured and very irregular, large white quartz veins, much stained by manganese oxide, and said to be of low grade. Assay No. 10, beyond, is from a sample taken by me from the small vein, and assay No. 11 is from a sample, also taken by me from the large vein. At twenty-four feet from the entrance to drift C, on the west side, is the stope, above mentioned. It is excavated on a quartz vein, which lies along the contact between the yellow and black schists. This stope extends upward from the drift, for about 15 feet, in a direction S. 80° W., the width of the stope being 4 feet, and the dip of the vein 50° to the southeast.

The south tunnel, with its drifts, cuts two black belts, one in the farther end of drift B, and the other in the back part of the tunnel.

So far as the drift goes into the south black belt, no quartz veins were observed. The strike of these slates is N. 85° E., and their dip, 40° to the northwest. The south margin of the north black belt is cut by the tunnel, 160 feet from its mouth; and a cross-section of the belt is exposed by the tunnel, for 53 feet. Numerous auriferous veins are in view all along this cross-section. These were sampled, and the result may be seen in assay No. 12, beyond. About fifteen feet beyond the first bend in drift C, is an incline, about 25 feet in length, below the floor of the drift, following, in an easterly direction, a quartz vein from 12 to 24 inches thick, along the contact of the yellow and black belts, but diminishing to about one inch, as it enters the black belt on the north side of the incline. A sample, taken by me from this vein, resulted as shown in assay No. 13. Notwithstanding the assay result is unfavorable, the fact, that the vein was worked to a greater extent by Judge Murray, than any other, shows, that it must have given encouraging returns on the mill. I was told, by my guide, who assisted in the prospect work, that this vein gave very good results; and I was surprised at the assay disclosure. From the amount of work done, it is possible, that this vein paid a considerable part of the expense of developing the property.

In another part of this report, reference has been made to the beautiful series of folds, shown in the black slates in drift B of the north tunnel, along the line of contact with the yellow belt. The entire drift is along this contact, the yellow belt overlying the black, the dip of the contact being toward the southeast. The rear part of the main tunnel was filled with *débris*, and the occurrence of the black belt, there, could not be examined. The last seven feet of drift C is in the black slates, where the dip is 70° to the northwest, and the strike N. 45° E. Very few quartz veins

were observed in the black slates of this tunnel ; and these, I was told by my guide, contained very little gold. For this reason, no samples for assay were taken from these slates. In the east and south tunnels, I took samples from the north black belt, which yielded results, as follows : —

No. 10	-----	1.550	ozs.	(\$32.04)	of gold per ton
" 11	-----	0.250	"	(\$ 5.17)	" " " "
" 12	-----	0.050	"	(\$ 1.03)	" " " "
" 13	-----	0.005	"	(\$ 0.10)	" " " "

Sample No. 10 was taken from the small high-grade vein in the black belt of the east tunnel, at the entrance to drift B; No. 11 was taken from two large veins in this drift, which I was informed were of low grade ; No. 12 was an average of all the veins in the north black belt of the south tunnel ; and No. 13 was taken from the contact vein along the incline in drift C of this tunnel. None of these samples showed sulphides. In fact, I saw no evidence of any appreciable amount of sulphides, in any of the veins, cut by these tunnels.

The HORNBLÉNDE-SCHIST of the district has been described, elsewhere, in this report. In the east tunnel, two apophyses cut through the yellow belt, as may be seen by reference to fig. 25; and the sharp end of another projects, for about two feet, above the floor of the tunnel, at the contact between the transported clay and the micaceous saprolite of the yellow belt, as is shown by its outline on the north wall. The decayed rock, as it appears here, is the common "brick-bat" of the district, already described.¹ While the mass is fine-grained, rough to the feel, and broken into small blocks throughout the main body; yet, near the contact with the mica-schist saprolite, the material of both kinds of schist is more

¹ See p. 284.

coarsely crystalline, and may be classed as gneissoid schist. Numerous small slickensides, parallel with the schistosity, are noticeable. The dip of these schists is from 30° to 35° to the northeast, coinciding with that of the mica-schist saprolite. As will be seen from fig. 21, the outlines of these apophyses are quite irregular, and their trend is almost normal to that of the large parent dike, whose southern margin occupies the north side of the ridge. It is a significant fact, that, in the south tunnel, which is farthest from the large dike, the only evidence of the presence of hornblende-schist consists of three narrow masses of the saprolite, some distance apart, in the back part of the tunnel, the largest of which is not over four feet wide. As before stated, the hornblende saprolite in the north tunnel is in immediate contact with the overlying clay deposit. On the east wall of the tunnel, this mass, which was encountered on both walls, at 50 feet from the entrance, was thirteen feet thick, while on the west wall, only three feet away, it was but five feet thick. The apparent dip of this saprolite, along the trend of the tunnel, was 20° to the northeast, the same as the dip of the surrounding mica-schist saprolite. The true dip of both, however, was ascertained to be 35° to the northeast, with a northwesterly strike. In drift C, a mass of the weathered hornblende-schist appears on the northeast wall, seventeen feet wide, while on the southwest wall the width is decreased by only one foot.

My guide informed me that the hornblende-schist yielded very little, if any, gold; so no sample of this material was taken for assay.

On account of the fresh, dry walls of the tunnels on this property, cut through the characteristic saprolites of Findley Ridge, it was selected for the study of the rocks; and I have dwelt on it, in detail, to a much greater extent, than is desirable, in the discussion of other prospects and mines along the ridge.

THE BOWEN LOT

Adjoining, on the west, the lot, which embraces the most of Crown Mountain, is what is known as The Bowen Lot, *No. 931, 12th district*. The gold belts, which have been described, in the presentation of the Crown Mountain property, pass through this lot, a little more than one-third of the lot being occupied by these belts, and the remainder, by the large dike on the north side of the ridge. On the east side of the lot, not far from the center of the north and south lot-line, a sixty-foot tunnel was run, some years ago, into one of the black belts, with what results, I did not learn. Over in the southwest corner of the lot, not more than seventy-five yards from the west boundary-line, a twenty-five-foot vertical shaft has been sunk to cut an incline, which begins, a few feet west of it. About fifty feet north of the vertical shaft is another incline, sixty feet deep, well timbered, and in good condition. These shafts and the tunnel have been made, by men, mining, in a small way. They are all driven into the black belt; and the ore from the veins was, probably, milled on the Capps mill. Beyond these small workings, nothing seems to have been done towards developing the property.

At the time of my visit, the veins were not in such shape, that I could take samples from them for assay. This property has been owned by Messrs. H. D. Ingersoll, of Dahlonga, and G. H. Ten-Bröck, of St. Louis, Mo.,¹ for about four years, having been bought

¹ Since this report went to press, this property has been purchased by Messrs. George H. Clark of Cedartown, Ga., and H. F. VanDeventer of Knoxville, Tenn. I am indebted to Mr. VanDeventer, for assays of ore from this lot, recently made by Messrs. Ricketts and Banks of New York City, from samples taken and forwarded by the owners, as follows:—

No. 1 — Old shaft, top of ridge . . 0.20 oz. (\$4.00) of gold per ton

No. 2 — Bottom of old cut . . . 0.16 " (\$3.20) " " " "

by them from Mr. Beverly Martin, as a part of the estate of his father.

THE CAPPS MINE ¹

The Capps mine, *lot 890, 12th district*, joins the Bowen lot, on its west side. The same gold belts, the yellow and black schistose saprolites, which pass through the Crown Mountain and Bowen properties, continue on through the Capps lot. The mine lies on the north side of Findley Ridge, near its top. It consists principally of an open cut, about 150 feet long and 100 feet wide, at the surface, and about 40 feet deep, on its north, or lower, side. The longitudinal axis of the cut is N. 50° E., approximately in the direction of the trend of the belts, the ore deposits dipping under the large dike. Lying next to the dike, is a yellow belt, about twenty feet wide; while, adjoining this, on the south, is the black belt, about 60 feet wide, which is regarded as the principal gold producer of the property. Nevertheless, all the material, taken from the cut, has been put through the mill, the ore, rich and lean, being reported to average \$2.00 per ton, on the mill. In the south side of the cut, about fifteen feet from its bottom, a short tunnel is driven into the black slates on a large vein, said to have considerable value. The ore of this vein, which is known as the twelve-foot vein, consists of saccharoidal quartz, impregnated with considerable auriferous pyrite; and it is said to assay as high as \$40.00 in gold per ton, and to mill \$3.00 per ton, on the ordinary stamp-mill. This vein has been opened, at different points along its outcrop, for at

¹ Field-work, for the most part, by S. W. McCallie, Assistant Geologist.

least 200 feet. At the time of Mr. McCallie's visit to the property the veins were not in such condition, that samples for assay could be taken.

About 400 feet southeast of the vein just described, is another, two feet thick, and of about the same external character. The upper part of this vein, where it occurs in the saprolite, with its pyrite decomposed, is said to yield fourteen dollars per ton on the mill; but, below water-level, where the pyrite is unaltered and the assay values, greater, the mill returns are much less.

In addition to the large cut, there are several shafts on the property, from ten to forty feet deep, which are largely prospect shafts.

The history of this mine can be briefly told. It was first worked for gold in 1840, by a man by the name of Capps, who erected on the property a small wooden stamp-mill, having three stamps, run by horse-power. Mr. Capps continued work, for about two years; and the work is said to have paid. From this time to 1885, nothing further seems to have been done on the property. Messrs. Ingersoll and TenBröck, who are mentioned above, as owners of the Bowen lot, erected an iron 10-stamp mill in the valley near the foot of the ridge, and began work, running the mill with water from the Hand ditch, and using an overshot-wheel. The property had then, long since, passed out of the hands of its original owner; and it was a part of the Martin estate, when Messrs. Ingersoll and TenBröck purchased it, with the Bowen lot, from Mr. Beverly Martin. These gentlemen operated the mine, for a few months, making the large open cut above described.¹

¹ Since the press-work was begun on this bulletin, this property has been sold, with the Bowen lot, to Messrs. Geo. H. Clark of Cedartown, Ga., and H. F. VanDeventer of Knoxville, Tenn. These gentlemen, in the spring

THE COLUMBIA MINE¹

This mine is located on *lot 988, 12th district*, adjacent to lot 947 of the Crown Mountain property, being the first Findley Ridge lot, east of Crown Mountain. The main part, of the work done, lies on the north slope of the ridge, most of it, in the northeast corner of the lot, ending, where the work, in the west cut of the

of 1897, sunk a shaft, in the bottom of the open cut, to strike the 12-foot vein. At the bottom of the shaft, the vein is said to be five or six feet thick. At the time of a visit to the property, recently made by me, the shaft was not in such condition, that the vein could be examined, or assay material, taken. But the ore, which I saw on the dump, was of the same character, as stated in the text. One specimen showed, very distinctly, particles of free gold with the pyrite; but my guide told me, that free gold was not of frequent occurrence in the mine. I am indebted to Mr. VanDeventer, who is himself a professional chemist, and a gentleman, whom I believe to be perfectly reliable, for assays, made for him, from samples taken from the shaft on the "12-foot vein," by several assayers, as follows: —

No. 1	\$12.00 of gold per ton
No. 2	17.50 " " " "
No. 3	12.00 " " " "
No. 4	16 oz. of gold and 0.22 oz. of silver " "

Nos. 1 and 2 were made by Mr. W. R. Crandall, M. E., Dahlonega, Georgia; No. 3, by Mr. J. W. Slocum; and No. 4, by Messrs. Ricketts and Banks, New York City. Of course, I quote these assays, because I am not able to furnish others, from samples taken by myself or my assistant; and the reader will have to form his own estimate, as to their value; though I have no doubt, as to their integrity.

¹ Field-work by S. W. McCallie, Assistant Geologist.

Preacher mine, on the adjoining lot, begins. Most of the early prospecting work was done, near the top of the ridge; and great difficulty was experienced in getting water to that point.

The first real mining, done on the property, was begun in 1882, by Mr. W. K. Lawrence, one of the owners of the lot. This work, which is shown, in a large open cut, was located near the top of the ridge, where some very rich ore-shoots are said to have been found. They were worked to a depth, many feet below the surface. The ore, taken out, was carried by flume to Yahoola creek, a mile away, where it was milled. After Mr. Lawrence had operated the property for a short time, it passed into the hands of the Columbia Mining Company, of Augusta, Ga. For two years, then, the property remained idle, after which Capt. J. L. Davis operated it, for a short period, making three large open cuts, in the northeast corner of the lot, beginning at the bottom of the ridge. These cuts, from twenty to thirty feet deep, follow three different veins, for from 150 to 200 yards, the veins, it is said, varying from a few inches to two feet in thickness, and being, in places, very rich. Besides the veins, Capt. Davis worked a considerable part of the saprolite, which he reports to have paid handsomely, many small nuggets being found, weighing ten, or more, pennyweights. The vein material was washed down a flume to the Columbia mill, which stood on the present site of the Preacher mill, the water, for sluicing, being pumped from the hand ditch to a reservoir near the top of Crown Mountain, giving a pressure of ninety feet in the cuts. Since the work done by Capt. Davis, no systematic mining has been attempted, though other parties have worked, in a small way, several rich shoots and ore-bodies on the property. Besides the open cuts mentioned, others from fifty to one hundred and fifty feet long, and tunnels of equal length, and shafts, extending down to water-level,

are quite numerous, though they were so filled with earth, at the time of Mr. McCallie's visit, that it was possible for him to examine only a few of the ore-bodies. These consist of the yellow and black belts, with their veins, the occurrence of which, on the Crown Mountain property, has already been described by me. The veins have the same strike and dip, as the schists, in which they occur, striking N. 45° W., and dipping 45° to the northeast, though neither the strike nor the dip is constant, varying, from place to place, by several degrees. In addition to three black and two yellow belts, another auriferous schist belt, known as the Fish Trap belt, crosses this lot on the south side of the ridge. I noticed, in the Lawrence cut, near the top of the ridge, an apophysis from the large dike, about the same size, as those in the east tunnel of the Crown Mountain property. Several small faults cross the northeast corner of the lot, dislocating the veins encountered. Two systems of quartz veins, nearly normal to each other, were noticed, in this part of the lot. Some of the veins are not less, than ten feet thick. In a large vein, known as "The Sand Vein," considerable pyrite occurs, which is said to be auriferous. I observed, on the dump from this vein, large white quartz blocks sprinkled with micaceous hematite, resulting apparently from the alteration of pyrite. The character of the quartz is saccharoidal, especially in the smaller veins. Some of it shows the cellular structure, due to the decomposition of pyrite.

Samples for assay were taken by Mr. McCallie; and these gave results, as follows:—

No. 1	.....	0.120 oz.	(\$2.48)	of gold per ton
" 2	.....	0.030 "	(\$0.62)	" " " "
" 3	.....	0.475 "	(\$9.82)	" " " "
" 4	.....	0.040 "	(\$0.83)	" " " "

No. 1 was taken from the Stumon shaft; No. 2, from the Clements tunnel; No. 3, from the Roberts cut; and No. 4, from a recent opening, well down towards the foot of the ridge.

This lot was granted by the State to David Adams. In February, 1849, it was sold, by the Administrator of the Adams estate, to Mr. Harrison W. Riley. It was sold again, in May, 1862, by Mr. Riley, to Mr. W. S. Roberts, President of the Augusta and Dahlonega Mining Co. It was next sold, March 1st, 1883, when it was purchased from the Augusta and Dahlonega Mining Co., by the Columbia Gold Mining Co. In January, 1887, it was sold by the sheriff of Lumpkin county to Mr. Alonzo H. Farrar, to satisfy a judgment in the Superior Court of this county, in favor of the Frank W. Hall Merchandise Co., of Dahlonega.¹

THE PREACHER MINE

This mine is situated in the northwest corner of *lot 995, 12th district*, which lies adjacent to, and east of, the Columbia lot. Like the Columbia, this lot includes a section of Findley Ridge, with the various yellow and black belts of schistose saprolites, bounded on the north by the large dike of hornblende-schist. The property, which includes the Preacher mill, located in the southeast corner of lot 986, is owned by four gentlemen, as follows: — A half-interest, by Judge W. W. Murray, and a sixth, each, by Messrs. J. Frank Johnson, J. C. Clements, and D. T. Harris, of Dahlonega.²

¹ Since this property was surveyed, it, with the Preacher and the Griscom lots, has been purchased by the Kentucky Mining Company, of Earlington, Ky., which has made great improvements on, and is, now, extensively developing, them.

² This property has, since, been purchased by the Kentucky Mining Co., of Earlington, Ky.

It is said, that this lot was first worked for gold, by a man, by the name of Dollison, about fifty years ago, evidence of his work being still seen, in what is left of two old inclines, which were begun at the top of the ridge, near the contact of the yellow and the north black belts, on two rich shoots in an auriferous quartz vein. The upper parts of these old inclines have been removed, in excavating what it now the central open cut, at the top of the ridge; but it is known, that the inclines went down, in a northeast direction, at an angle, agreeing with the dip of the schists, for about forty feet, when the trough-fault, described in another part of this report¹, was encountered, and Dollison lost his vein. It is said, that the schists of the trough-piece were slightly auriferous; but, that they were so much "leaner", than the vein, he had been working, that Dollison abandoned the inclines. It is expected, by the present owners, that they will find the lost vein, on the north side of the trough-fault. The ore, taken by Dollison from the two inclines, was hauled in wagons, two miles, to a 3-stamp mill, the stamps being of the wooden type, then in use, and the device, for saving the gold, being an ordinary riffle-box. This ore is said to have yielded an average of \$20.00 a ton, even on this crude mill. The property, at that time, was leased by Dollison from its owner, Mr. James M. Brawner, of Elbert county, to whom the property was originally granted by the State. The work continued, for only a short time when the vein was lost. No work seems to have been done on the lot, from that time to 1885, when Mr. Marion Chester, a miner, found, in the black slates, lower down the ridge, a rich auriferous quartz vein. Having secured a lease on the property, from Rev. H. S. Rees, of Turin, Ga., its then owner, he, with Col. Robt. H. Moore and Mr. Robert Howell, began to work the vein. Three

¹ See page 296.

months after operations began, Mr. Chester sold his interest in the lease to Mr. Jno. L. Wallace; and work was continued, off and on, for four years, the entire work, during this time, consuming not more than a year. After working a rich shoot of the vein, for some distance down, a tunnel, with its entrance in what is now the northwest cut, about twenty feet above the base of the ridge, was driven, for 250 feet, to cut the vein lower down. From this tunnel, the rich shoot was then stoped out, up to where work had been discontinued in the incline; and the incline was continued further down, at an angle of 45° , until it measured eighty feet below the tunnel floor.

The vein, at the surface, trends N. 55° E., and has a vertical position; but Mr. Chester informed me, that, at some distance down, it flexed under the ridge, occupying, thereafter, a position between the schists. He stated, that the vein was richest, along this fold. When the rich shoot, along which work had been prosecuted, had been excavated to a depth of 300 feet, thirty feet below water-level, the lessees were compelled to abandon it, on account of having to lift, with a hand-pump, an 80-foot column of water, in order to keep the shaft free. A further reason lay in the fact, that, as the ore became more pyritiferous below water-level, the amount of gold, which could be extracted by the mill, was constantly decreasing, with a consequent loss to the operators; though it is said, that, when work ceased, the ore was yielding \$25.00 per ton, under the stamps.

When the incline had been excavated, for only fifty feet from the surface, the fault, elsewhere mentioned, in this report, was encountered, and Mr. Wallace withdrew from the enterprise. After some prospecting for it, the vein was found, about six feet north of where it had disappeared, and a few feet lower down.

The average width of this vein was about two feet; and the rich

shoot extended twenty feet along the trend of the vein. This much of the vein was stoped out, to the bottom of the 300-foot incline. The ore, above water-level, consisted of free-milling, saccharoidal quartz, more or less cellular, and stained by iron oxide. Much of it is said to have shown free gold, in liberal quantity. Below water-level, the ore contained considerable pyrite.

Messrs. Moore, Howell and Wallace hauled their ore in wagons, at first to the old Columbia mill, but, later on, to the Lockhart mill, paying fifty cents per ton, and twelve-and-a-half cents per miner's-inch, additional, for water, at the former, and one dollar per ton, at the latter.

After abandoning the shoot, thus far worked, Messrs. Moore and Howell began work on another vein in the black belt, parallel with the first, and about thirty feet north of it, farther down the ridge. It was essentially of the same character, as the first vein; but, instead of one, there were three rich shoots, about ten or twelve feet apart, the shoots dipping a little more, than in the upper vein. The ore, too, of the second vein was of the same character, as that of the first. Work was begun at the surface, on the lowest or most western shoot, and the one next above it, the third not having been discovered, at that time; and, later on, when these inclines had been sunk to some little depth, a vertical shaft was sunk, farther east on the vein, to a depth of thirty-five feet, cutting through the two upper shoots, the topmost, which was entirely new, being supposed to be one of the two, on which the inclines had been started. From this vertical shaft, inclines were sunk, and the shoots were stoped out, to water-level. Both shoots were then stoped upward, to the point, where they were dislocated by the fault. Here, work was stopped by Messrs. Howell and Moore, after having stoped out the bottom shoot from above, to where the vein was faulted. Soon

after these gentlemen discontinued work, Mr. J. Frank Moore, a son of Col. Moore, and Mr. J. B. Clements began work on the mine, sinking the vertical shaft deeper, and encountering the lowest shoot, at about twelve feet below, thereby discovering, that there were three, instead of two, shoots. This firm worked the middle shoot twenty feet further, stopping at about twelve feet below water-level. The lowest shoot, they worked from the bottom of the shaft, till it was twenty-five feet below water-level; and from the bottom of the shaft, they stoped it out, in an upward direction, to the fault, a distance of about forty-five feet. I was informed by Mr. Clements, who kindly guided me over the property, that the fault line presented good slicken-sides; and that, by excavating, from the fault end of one of his inclines, for twelve feet, in an upward direction, at an angle of 45° toward the south, and along the slicken-sides, he drove into the end of the corresponding incline, where Messrs. Moore and Howell had stopped work. The tunnels and shafts, at the time of my visit, were not in such condition, that I could examine the faulted veins; but the dislocation was plainly noticeable, at the surface. Both veins were cut by the same fault, and they were similarly affected.

Messrs. Moore and Clements hauled the most of their ore, three quarters of a mile, to the Lawrence mill in Dahlonega, paying seventy-five cents a ton for milling; but about seventy-five tons of it was hauled to the Mary Henry mill on Yahoola creek, one and a half miles from the mine, the same tariff per ton being paid for milling. I was informed by Mr. Moore, who is a merchant in the town of Dahlonega, that the ore, worked by himself and Mr. Clements, averaged ten dollars per ton, under the stamps, notwithstanding the fact, that much of the ore was highly pyritiferous. This firm worked the lower vein, off and on, for about two years, the entire

work, however, not consuming over six or eight months. Having reached the point, where they had to contend with too much water, for their outfit, and with an ore, constantly increasing in the unaltered condition of its sulphides, they abandoned the old shafts, and spent more than a year prospecting. Mr. D. T. Harris, of Dahlonga, was then taken into the firm; and, having leased the Stanley 5-stamp mill, they began work at the top of the ridge, in the yellow belt, by inclines and open cuts, hauling the saprolite, with included small quartz veins, in wagons, to the mill. They worked, in this way, continuously, for a year, when the lease on the mill expired. Up to this time, all work on the property, since 1885, had been done, under lease from its owner, Rev. H. S. Rees, a Baptist clergyman, who had purchased it from the heirs of his wife's father. But, in January, 1895, the property was purchased by Judge Murray, who, in April, following, sold a half interest in it to Messrs. Moore, Clements and Harris; and the four have worked it, continuously, since then.

The old Columbia mill had been removed; and, in May, these gentlemen began the erection of a 10-stamp mill on its site, which is known as the Preacher mill. They ran a line of 4-inch gas-pipe, from the mill to the top of the ridge, for the purpose of carrying water to the reservoir at that point, pumped from the Tan-yard branch at the mill. The reservoir was 104 feet long by 14 feet wide by 4 feet deep, with a working capacity of 35,000 gallons of water.

On the 4th of July, following, the firm began work, in the extreme northwest corner of the lot, at the foot of the ridge, in the north black belt, digging out the saprolite and its vein content, and flooding it twice a day, through a flume, to the mill, 1,100 feet of the flume being supplied with riffles, and the remainder with false-

bottoms. This flume discharged its contents into the mill-house, the muddy water, bearing up much of the more finely divided gold, passing through the racks and into the Tan-yard branch, while the coarser material remained in the ore-bin, to be passed through the mill. It was ascertained by the firm, that the loss of a great deal of the gold attended this method of flooding ; and Judge Murray, at the time of my visit, was taking steps, by which he hoped to obviate this difficulty. Four or five miners found it profitable business, to pan the débris from this mill, for a considerable distance down the Tan-yard branch ; and it was their daily avocation.

At the time of my visit, the cut above mentioned, which I shall designate as the *Northwest Cut*, had been completely excavated, for about three hundred feet, in a line, S. 32° E., through the black belt, to the top of the ridge, where it was made continuous with an open cut, running 162 feet, along the top of the ridge, N. 68° E. These cuts varied, in width, from fifteen to forty-five feet, and, in depth, from about eight feet, at the bottom of the ridge, to something like fifty feet, in the cut at the top, which I shall designate as the *Central Cut*. The walls of this cut were, respectively, the north and the south black belts, the intervening yellow belt having been scooped out, to the bottom of the cut, and sent to the mill. From the lower part of a small cove, farther east, beginning at the north lot-line, another cut had been started, with a branch flume, connecting with the first, farther down toward the mill, the northwest cut not affording sufficient drainage. This cut was, at the time of my visit, 275 feet long, with a trend N. 47° E. Its widest point was 50 feet, and its deepest was about the same, with an average depth of, probably, forty feet.

Work on the yellow belt was being rapidly prosecuted ; and only thirty-five feet of it was left between this cut and the east end of

the central cut. Before my field-season closed, this entire mass had been removed and milled, making a continuous cut from the foot of the ridge, where the work began, in the northwest cut, to the lower end of the *Northeast Cut*. This, however, was subsequent to my survey of the property. The northeast cut is wholly in the yellow belt, though the south black belt forms the lower end of the southeast wall, opposite which, forming the lower part of the northwest wall, is an apophysis of decayed hornblende-schist, from the large dike farther down the ridge.

In the lower end of this cut, the yellow schists have been mined to the south black belt, except a thin, wedge-shaped layer on the surface, which extends only a short distance up hill; but, on the north side, beyond the cut, there still remains about thirty feet of the yellow schists untouched, giving an approximate maximum width of eighty feet to the yellow belt. In the central cut, it did not exceed forty feet. While the central cut coincided with the trend of the belt, the northeast cut was diagonally across it, but, approximately, in the direction of the schistosity. The normal schistosity seems to be to the northeast; and the variation to the southeast is likely due to folding. In the upper end of the northeast cut, the yellow schists dip, along the southeast wall, at an angle of 25° to the southeast, and strike northeast; while, on the northwest wall, they dip at an angle of 35° to the northeast, and strike northwest, indicating an anticlinal fold.

In the central cut, along the north wall in its west end, the black slates dip 70° to the northeast, and have a northwesterly strike. On the same wall, at the other end of the cut, just beyond the trough-fault, they dip about 25° to the southeast, and strike northeast. On the south side of the cut, the dip of the schists of the south black belt varies from 25° , at the east end of the cut, to 35° , at its west.

end, being constantly to the southeast. The trough-fault, which crosses this cut, in an east and west direction, has been described elsewhere in this report.¹ The fault, which dislocates the two auriferous veins described, is parallel with the trough-fault, in trend, and is eighty feet north of it. Still another fault crosses the lower end of the northeast cut, dislocating the yellow and black schists, with a throw of three feet to the south. This fault, like the others, is of the type, known as normal faults.

Samples of ore, for assay, were taken by me, in the central and northeast cuts. The northwest cut had fallen in, from long disuse, and the veins were covered. It was impossible to take material from the shafts, which were filled with water, and which were otherwise inaccessible. The results of assay are as follows: —

No. 1	.....	0.06 oz. (\$1.24) of gold per ton
" 2	.....	0.02 " (\$0.41) " " " "
" 3	.....	0.01 " (\$0.21) " " " "
" 4	.....	0.20 " (\$4.13) " " " "

No. 1 was taken from the yellow decomposed schists and their included quartz veins, in the central cut; No. 2, from all the quartz veins in the black slates, in the same cut; No. 3, from the fresh yellow schists, as the material was being dug out, for a flood-run, at the upper end of the northeast cut, and from the walls on either side; and No. 4, from the quartz veins in the south black belt, at the lower end of the same cut.

On this property, very beautiful specimens of auriferous saccharoidal quartz, containing plates of gold six or eight millimeters in width, have been found, occasionally. A handsome suite of these are on exhibition, in the State Museum.

¹ See page 296.

Besides the black and yellow belts, the Fish Trap belt crosses this lot, on the south side of the ridge. So far as I was informed, however, no work has been undertaken on this belt. It may be well to add, that the only work, done on the south black belt, is the stoping, for a short distance, of a rich shoot.

This lot was originally granted to James M. Brawner, of the county of Elbert, in 1832. In November, 1858, it was deeded to Mr. Brawner's heirs, by the executor of his estate. In March, 1880, it was bought, by Rev. H. S. Rees, from the heirs of Mrs. C. S. Moon, a daughter of the grantee and mother-in-law of Mr. Rees. From Mr. Rees, the property was bought by Judge W. W. Murray, in January, 1895; and, in April, following, Judge Murray sold an undivided half of the lot to Messrs. Moore, Clements and Harris, who, with him, are now working the property, as has been detailed above.

The Mill, belonging to this property, is a 10-stamp mill, of the F. W. Hall patent, the stamps weighing 450 pounds, each. It has two 10-foot amalgamated copper plates, with a sand box at the end of the plates, followed by a "quick-trap". The mill-house is in fair condition; and it contains, besides the mill, a 35 H.P. upright boiler, jacketed with brick; a 10 H.P. horizontal automatic engine; and a 6-inch duplex double cylinder Deane pump. The mill was used, three years, at the Gordon mine, and one year at the Mary Henry mine, before it was set up, at its present location. In addition to this mill, there is, in the mill-house, a small 5-stamp steel mill, with 125-pound stamps, built for a test-mill. It is not now in use. An office and a chemical and assay laboratory, partly equipped, and in a new building; a workshop, also new; and a hydraulic giant, at the mine, with necessary iron pipe, complete the equipment.

THE GRISCOM MINE ¹

This mine is located in the southeast corner of *lot 996, 12th district*, which lies adjacent to and immediately north of the Preacher lot. The southern part of this lot includes a part of the north slope of Findley Ridge; while a branch, starting in a spring, near the foot of the ridge, flows north through the east half of the lot, emptying into the Tan-yard branch. Along this branch, there was formerly a considerable deposit of auriferous gravel; but most of it was worked for gold, many years ago. Some valuable nuggets are reported to have been found in this placer. There still remains a small unworked area, which it is thought, will prove profitable, when mined.

Adam Peck, "away back in the forties", was, probably, the first man to attempt vein mining. He ran an incline on a rich shoot in a vein, from eighty to a hundred feet deep, in that part of the lot, in which the Reid cut has since been excavated. It was current belief, at the time, that Mr. Peck made, what was then considered a great deal of money. About the year 1880, Mr. Harry B. Neal and his brother came from Virginia; and, having purchased the lot, they started what is now known as the Reid cut, working the veins, which had been discovered, many years before, one of which had been worked by Mr. Peck. They worked for about a year, using a 10-stamp mill. What their results were, I am not able to say; but, in February, 1879, as elsewhere related, they sold the lot to Mr. Samuel E. Griscom of Philadelphia, Penn. Shortly after that, Mr. Joseph Reid began work on the cut, as superintendent for Mr.

¹ Field-work by S. W. McCallie, Assistant Geologist.

Griscom; and he very materially enlarged it, working for three or four years, and milling the ore on the 10-stamp mill, on the lot. He is reported, to have found some very rich ore-shoots, which made the mine quite profitable, until the ore was stoped out to water-level, when the shafts were abandoned, on account of the sulphides.

About 1890, Mr. Geo. M. Stanley of Jackson, Mich., purchased the property. He erected a 5-stamp mill on the property, soon afterwards, the Griscom mill having been sold and removed, some time before. He then began mining operations; but, not being familiar with mining methods, it is said, he soon became discouraged; and, suspending work, he returned to Michigan, leasing the mill to Messrs. Moore, Clements and Harris, who were operating the Preacher mine, adjacent. In November, 1895, Mr. Stanley deeded the property to his wife, Mrs. Mary L. Stanley, its present owner.¹ The stamp mill has since been removed, leaving a small engine and boiler, in good condition and well housed.

The character of the ore deposits is the same as that of the Preacher mine, of which these are but a continuation. Both the black and yellow belts cross this lot; but the Fish Trap belt is too far south. Both the former are to be seen in the large open cut, above mentioned, which lies by the side, and just west, of the middle Gainesville road.

At the time of Mr. McCallie's visit to the property, it was not in such shape, that samples for assay could be taken.

The Griscom lot was granted by the State to Drewry Wall, Sr., of Rabun county, in 1832. In April, 1848, Mr. Wall sold it to Jesse C. Henly. A few days later, Mr. Henly sold a half interest in it to John W. Grady. In 1855, Mr. Henly was pushed,

¹ The Kentucky Mining Co. has bought this property, also, since 1896.

one night, out of the court-house door, by a drunken man; and, falling on the sharp corner of the steps, he was injured internally, so that he died, in a few hours. The feature of this incident, of interest at the present time, is, that the coroner of the county levied on the dead man's property, to pay the costs of the inquest. So, the half interest belonging to Mr. Henly's estate, was sold by the sheriff, and, by him, was deeded to William Martin, May 12th, 1855. From Mr. Grady, his half interest passed to Mr. Martin, in August, 1857. From Col. W. P. Price, his wife and other heirs of Mr. Martin, the lot was bought by Harry B. Neal of Virginia, except the farming interest in four acres around the mineral spring, a mortgage being filed, on the day of the sale, Sept. 29th, 1877, to secure deferred payments to Col. and Mrs. Price and her sister, Mrs. Fannie K. Harris. After working the mine for some time, as has been before related, Mr. Neal, in February, 1879, sold the lot to Mr. Samuel E. Griscom of Philadelphia, except the farming interest, above mentioned, the sale being subject to the mortgage in favor of Col. Price and others. This mortgage was foreclosed in July following; and the sheriff deeded the lot, except the farming interest in the four acres around the spring, to Col. Price, his wife and Mrs. Harris, her sister. What further title Mr. Griscom had to the lot, the records do not show; but the title must be good; as "Samuel E. Griscom, by his attorney in fact, W. P. Price," sold the lot, except the four acres, in June, 1890, to Mr. George M. Stanley of Michigan, who deeded the entire lot to his wife Mrs. Mary L. Stanley, the present owner, in November, 1895, Col. Price having deeded the farming interests in the four acres to Mr. Stanley, in April, 1894.

THE BAST MINE

Looking southeast from the neighborhood of the public square in Dahlonega, the attention is arrested by a large open cut, running along the north side of Findley Ridge, near its top. This cut is on the east side of *lot 1,035, 12th district*, its east end stopping abruptly, about the middle of the north and south lot-line, between this and the Findley mine lot, No. 1,048. This cut constitutes what is known as the Bast mine, named for Mr. Emanuel Bast, of Ashland, Penn., one of its former owners and operators. The cut is 650 feet long by about 60 feet wide. Its south wall is about fifty feet high, and its north wall, about twenty feet, in the present condition of the cut; though, in places, the original bottom is said to be covered, by about twenty feet of *débris*. Along its longitudinal axis, the cut has a direction, N. 76° E., approximately the trend of the belts. In fact, the cut has been made by excavating the yellow belt, nearly to the point, where the saprolitic condition gives place to the unaltered schist. Still, a portion of the yellow saprolite remains in place, dipping under the large dike, and averaging, probably, fifteen feet thick. The north wall, in the west end of the cut, presents an excellent exposure of the hornblende-schist, the most of it, in an almost completely altered condition, but the remainder, showing all stages of alteration. About midway of the north wall of the cut, a drain was cut through the hard, unaltered hornblende-schist, through which the ore could be flooded to the mill. The large dump-pile, resulting, furnishes, in abundance, all the variations of this rock, from the holocrystalline to the aphanitic schist.

Third in the series of these belts, as they lie in this cut, is a belt of the black slates, which forms the south wall of the cut, and dips

under the belt of yellow schists. The strike of these slates, taken in the east end of the cut, was N. 65° W., and their dip 55° to the northeast. The strike of the hornblende-schists is N. 80° W., and their dip, 45° to the northeast.

Lying between the yellow and black belts, is an auriferous quartz vein, known as the "Big Sand Vein." The trend of this vein is N. 50° to 60° E., which approximates that of the yellow and black belts. The ore from this vein is said to have yielded \$11.00 or \$12.00 of gold per ton. In the west end of the cut, the vein is about fifteen feet wide; but, at the point, where my sample for assay was taken, 150 feet east, it is only two feet wide. Beyond this, in an eastward, direction, it is covered by the weathered material, which has fallen in, from the walls; but, near the drain cut, where it is twenty feet under this soft material, it is said to be eight feet wide.

Only a few feet from this vein, was another, in the yellow belt. A prospect shaft, about ten feet deep, has recently been driven through the unaltered schists, along the dip of this vein. The hard schists, which surround the vein, are pearl-gray, and consist, chiefly, of a hydrous mica, the species of which has not yet been determined. These schists, which, as I have before stated, are, evidently, in part, at least, the unaltered material of the yellow belts, are, by no means, so quartzose, in character, as the underlying slates of the black belt, at the Findley mine. The vein, which is of hard, white quartz, containing considerable of the hydromica-schist, in layers longitudinal with the vein, is about eighteen inches thick; and it dips with the slates about 40° to the northeast, striking northwesterly. The ore, taken from the shaft, is highly pyritiferous; and I saw quite a number of specimens, which showed liberal quantities of free gold in plates, with the pyrite. This seems,

though, to have been local; as the sample for assay, taken by me, only a few feet below, proved to be of low grade.

In the east end of the cut, a vein has been followed by a tunnel, sixty feet long, into the Findley mine lot, adjoining; and, just opposite, on the other side of the cut, is another tunnel, running 100 feet, in a southwest direction, on the Bast lot. These tunnels have been abandoned, for some time; and they were not in condition for examination, at the time of my survey of the mine.

Two samples, taken by me, were assayed, yielding the following results: —

No. 1	0.090 oz. (\$1.86) of gold per ton
" 2	0.095 " (\$1.96) " " " "

No. 1 was taken from the vein in the yellow belt, at the bottom of the prospecting shaft. It was composed of quartz and hydro-mica-schist, impregnated with considerable pyrite. No. 2 was taken from the "big sand vein", at the bottom of the cut, about a hundred and fifty feet from its west end, and only a few feet from the shaft in the yellow belt. The sample was taken from about twenty-five feet of the vein, exposed. The material was saccharoidal quartz, more or less cellular, and stained by iron sesqui-oxide, resulting from the decomposition of pyrite, some of which still remained, unaltered. Good specimens of botryoidal pyrolusite were taken from this vein, in getting this sample for assay, it being a secondary mineral, resulting from the alteration of the black slates.

On top of the ridge, about sixty feet from the open cut, is the remnant of the old reservoir, used for hydraulicking the soft, decayed auriferous schists, from the cut to the mill, which is located below the cut, about midway up the ridge. Water, taken from the Findley ditch, was pumped from the mill, through a pipe-line, to the reservoir, from which it was conveyed, by various trenches, to

different parts of the cut, as needed. The reservoir is sixty feet long, forty feet wide, and four feet deep; but it is now in a very dilapidated condition; and, for further use, it would require rebuilding.

The mill-house, while well built, of good, strong timber is badly decayed, for five or six feet from the ground; and considerable rebuilding will be required, to place it in proper condition. The mill is a 10-stamp Hall mill, the stamps weighing 450 pounds, each; but it is in bad shape, and considerable repairing would be necessary. An 80 H.P. horizontal engine is in good condition, and well mounted, on a substantial brick foundation. Two large tubular boilers, with wood furnaces, are enclosed in a brick encasement on the back and sides, fitted to the square iron front. These walls are nine feet high; the rear wall is ten feet long, and the side walls, fifteen feet; all are in good condition.

On the hillside, just back of the mill, is an old drying oven, built immediately after the war by a man, by the name of Moyer, superintendent of the Consolidated Gold Mining Co. of Georgia. It is built of stone, and is ten feet high, eleven feet wide, and eleven feet deep. The furnace opening, in front, at the bottom, is two feet high and four feet wide. The ore receptacle, or oven, is funnel-shaped, from the top of the masonry to the furnace, seven feet, wide, at the top, and three-and-a-half feet, at the bottom, which is not now in place, but which consisted of an iron plate; this receptacle is made of riveted three-sixteenths-of-an-inch, boiler iron. A smoke-stack, of the same material, runs from the furnace through the center of this oven, and is perforated to the top of the structure. The smoke-stack originally extended ten feet above the top of the oven; but the exterior part now lies on the ground, in front of the furnace. I present, in plate XVIII, a view of this old drying oven,

which was called a roaster by the operators, and which, on information first received, I designated as a "roasting furnace".

Lot 1035, 12th district, was originally granted by the State to Thomas H. Attaway, at the time of the division and distribution of the Cherokee country of North Georgia, in 1832. The first deed to this lot, of record in the court-house at Dahlonega, is a quit-claim deed, dated January 22nd, 1861, from James J. McCroan to Elsha Keen, for one twelfth of the lot; and, on March 22nd, following, Jacob Lewis gave to Keen a warranty deed to one eighth of the lot. In June of the same year, Isaiah Attaway and wife conveyed, by warranty deed, an undivided fourth of the lot to Keen; and, a few days later, Keen sold 18 $\frac{1}{3}$ acres of the lot to Augustus F. Franklin. McCroan, Lewis and Isaiah Attaway were heirs of Thomas Attaway. In November, 1877, Franklin deeded an undivided half of the lot to Mr. Wm. J. Worley, who, in September of the following year, sold it to Mr. Emanuel Bast, the Attaway heirs, on the same day, selling to Mr. Bast, by their attorney in fact, Mr. William J. Worley, the other undivided half. In July, 1879, Mr. Bast sold the property to The Pennsylvania National Gold Mining Company of Georgia, with all improvements, water-rights etc., this company being succeeded in June, 1880, by the Consolidated Gold Mining Co. of Georgia, of which Mr. Bast was president. This company had also bought the Ivey mine; and it operated the two, simultaneously. In June, 1886, the Bast lot, with the 20-stamp mill and all appliances and appurtenances, was sold by the sheriff to the Frank W. Hall Merchandise Co. of Dahlonega, to satisfy a judgment of Court, in favor of that company against The Consolidated Gold Mining Co. of Georgia. In the latter part of the same month, a half interest in the lot was duly conveyed to Mr. Frank W. Hall, and in October, 1889, the other half was conveyed to him. In February, 1890, Mr. Hall deeded the entire lot, the mill etc. to

The Dahlonge Co., Limited; and in March, 1893, these were sold by the sheriff, and deeded to Mr. Hall by Capt. John W. Weaver, Receiver for the Dahlonge Co., Limited. Mr. Hall has, since, been the owner of the property.

A part of the history of this mine has peculiar interest, in that it shows one of the numerous nefarious schemes, which have been perpetrated by adventurers, coming into Georgia, and which have militated against the development of the gold deposits of the State. In 1889, a man, representing, as Managing Director, an English syndicate, styled THE DAHLONEGA CO., LIMITED, purchased through Mr. Frank W. Hall, of Dahlonge, agent for the owners, the Ivey, the Lockhart, the Fish Trap and the Bast mines, for the sum of \$40,000 (the Lockhart, at that time, including the Singleton mine), upon condition, required by the Managing Director, that the owners should deed the first three properties, as named above, to The Dahlonge Co., Limited, and that the Bast mine should be deeded to the person or persons, thereafter to be named by him. After consulting counsel, as to the legality of such action, the owners of the four properties agreed to the condition; and \$40,000 spot cash was paid them, he leading the syndicate to believe, that the entire amount was used, in the purchase of the Ivey, the Lockhart and the Fish Trap mines. He then represented to his associates, that, while he had been able to secure these valuable properties for \$40,000; still, Mr. Hall had, remaining, the Bast mine, which the Managing Director said, was one of the most valuable in the State, and for which the owner positively declined to take less than \$40,000. He colored the subject so adroitly, that his co-directors issued, and turned over to him, at his suggestion, \$40,000 in debenture bonds, secured by a mortgage on the four mining properties, in order that he might purchase the Bast mine for the syndicate. He then transferred the bonds to his brother, living in London, and directed Mr.

Hall to have a deed to the Bast mine made to The Dahlonga Co., Limited.

The syndicate having provided additional funds, for the development and systematic working of the mines, the Managing Director selected Mr. A. B. Lindermann of Philadelphia, as General Superintendent of the mines, with headquarters at Dahlonga. Mr. Lindermann, having put several of the mines in good shape, began to work some of them; the Singleton, he leased to a man who, it is said, made considerable money, by working the placer deposits of this mine. Immediately after the promoter, who subsequently became Managing Director, had purchased the mines, he made a contract with The Frank W. Hall Merchandise Co., to put the Cane Creek ditch, belonging to the Ivey mine, and the Singleton ditch, in good repair; and he ran up additional accounts, at their commissary. Not being able to get a settlement with him, The Frank W. Hall Merchandise Co. brought suit, in the early part of 1892, against The Dahlonga Co., Limited, in the Superior Court of Lumpkin county, by which the syndicate learned, for the first time, of the double dealing of its Managing Director. The chagrin of the syndicate, at this discovery, resulted in a resolve to defeat his plans, at any cost. They made Mr. Hall their agent, and instructed him to acknowledge judgment, and to have the several properties sold by the sheriff, and to settle the obligations, incurred by the Managing Director, with the Frank W. Hall Merchandise Co. and other concerns in Dahlonga. Things having taken this shape, the brother of the Managing Director, to whom the latter had transferred the debenture bonds, brought suit, in the United States Circuit Court in Atlanta, to foreclose the mortgage on the several properties, which had been given, to secure payment of the bonds. As soon as action was begun, the Superior Court of Lumpkin county appointed Capt. John W. Weaver, of Dahlonga, Receiver. Capt.

Weaver held this position, for about two years, until the properties were sold, by order of the Court, at public outcry, before the Court-house in Dahlonga, March 7th, 1893. Mr. Hall purchased the properties and paid off the expense indebtedness; and the attorney for the brother of the Managing Director gave notice, at the sale, that the properties were subject to the debenture bonds. In November, 1895, a decision was rendered, in the United States Circuit Court in Atlanta, declaring, that the mortgage, to secure the bonds, was not valid, thereby releasing the several properties from any claim, on account of the bonds.

Criminal proceedings were instituted in England against the late Managing Director of The Dahlonga Co., Limited, whereupon, it is said, he fled to some one of the South American countries, where he has, since, resided.

Mr. Hall, to whom I am indebted for the facts, as narrated above, is, still, owner of these mining properties. That they were involved in this ugly transaction does not, of course, discredit, in the least, their value as mining properties.¹

THE FINDLEY MINE

At the northeast end of Findley Ridge, are two very extensive cuts, in what is known as the Findley mine. This mine includes

¹ In this connection, it may be of interest to know, that, in July, 1897, that part of the Lockhart property, known as the Singleton mine, was sold, for \$23,000, to Mr. John B. Atkinson of Earlington, Ky., and others, who have since organized, as The Tahloneka Mining Co.; and that this company is now making extensive preparations, for operating the property, with modern equipment and methods.

lots 1,047, 1,048 and 1,057, 12th district, 1,048 adjoining the Bast lot, which lies west of it. Probably, no mine in the county enjoys a better reputation, than the Findley mine; but comparatively little work has been done on it, for several years. Still, the work, done, has placed it in a state of development, that is equalled, in not more than three or four other mines in the county. In a large open cut, near the top of the ridge, the yellow and black schists have been taken out, to the point, where the saprolitic condition of the black slates begins to change to the hard, unaltered underlying quartzose slates. These contain considerable quantities of an undetermined dark-green chlorite, arranged parallelly along the plane of schistosity. A shaft was sunk, during the civil war, a hundred feet in the top of the hill, the lower half extending through the hard chloritic quartzose schists. After the war, the shaft was sunk twenty-four feet lower; and the dump, from this last work, in the large open cut on the top of the ridge, affords excellent specimens of the unaltered quartzose schists. At no place, can one get a better idea of the character of the black slates, than in this large approximately square cut in the Findley mine. The northeast wall shows the overlying yellow belt, about twenty-five feet thick from the surface, and about forty feet of the black belt, to the bottom of the wall. These all dip, at about 35° to the northeast, and have a northwesterly strike. There are two very prominent auriferous quartz veins in the cut, one of which, the "dead-horse" vein, is intercalated between the black slates, and dips, with them, to the northeast. The other is in an almost vertical position, dipping slightly to the northwest, and having a northeasterly trend. This vein, which varies from one to twelve feet in width, contains considerable galena in places; and it has produced some very handsome specimens of free gold in quartz, two of which, showing dark-

green hornblende, as an associate of the gold, are on exhibition in the State Museum. The quartz of the "dead-horse" vein is more finely granular, shows more oxidation of the pyrite, and contains much more of the mica-schist inclusions throughout; in fact, it is typical of the "stringer lead". In addition to these, there are two other veins, which were covered by débris, at the time of my examination of the property, but which have been examined, since, by my assistant, Dr. Watson, who describes them, as follows:— Vein No. 3 lies adjacent and parallel to the "dead-horse" vein. "The two veins are quite similar in appearance, and are some twenty paces apart. The former vein will probably average from one to four feet in width, and is composed of quartz, which is more or less stained from the pyrite decay. Vein No. 4 is about forty paces from Vein No. 3, near the southeast end of the cut, and from the character of the material, from which the vein is made up, is known as the "cement" vein. At the time of my visit, the vein was almost entirely covered with débris, which renders a definite and accurate description impossible. However, the vein apparently consists of two branches, partially exposed along the face of the cut, the material of which is a soft, highly-colored ferruginous mass. The original rock, from which this material was derived, cannot be recognized from the decayed product."

The work, which has given the greatest reputation to this mine, has been the excavation of an incline, on a remarkably rich shoot in a vein, a little south of the upper cut. Large quantities of very rich free gold specimens have been taken from this incline, which has been stoped, for 350 feet. It is stated on good authority, that this shaft has yielded about \$300,000, of which \$200,000 was taken out before the war. The work is more fully described, beyond. The last work done on this shoot was about five years ago; and, as

a consequence, the incline was not in such condition, that I could examine the vein or take samples for assay. Some of the most beautiful specimens of free gold in quartz, which have been produced by this county, have been taken from this shaft. Below water-level, the ore of this mine is an auriferous sulphide quartz.

Material, selected, from the several veins in the upper cut, by Dr. Thomas L. Watson, Assistant Geologist, and assayed by him, in the laboratory of the Survey, gave the following results :—

No. 1	0.40	ozs.	(\$ 8.26)	of gold per ton
" 2	0.50	"	(10.33)	" " " "
" 3	0.45	"	(9.30)	" " " "
" 4	0.55	"	(11.36)	" " " "
" 5	1.10	"	(22.73)	" " " "

Nos. 1 and 2 were taken from the vertical vein; the former, from the middle of the exposed part of the vein, along its trend, to the top of the wall on the west, and the latter, from the middle, to the bottom of the open cut. No. 3 was from the "dead-horse" vein; No. 4, from the adjacent parallel vein; and No. 5, from the "cement vein".

Farther down the end of the ridge is the other large cut, worked, some years ago. This cut begins at the bottom of the ridge. A tunnel extends, along the trend of the vertical vein, from the upper to the lower cut.

On top of the ridge, is a reservoir about 150 feet long, 15 feet wide and 6 feet deep, from which water is delivered, by ditches and iron pipes, to various parts of the open cuts, for making the flood-runs of saprolite from the cuts to the mill, and for operating the hydraulic giants.

On lot 1,087, across the creek, is a large vein, known as the

Evans vein, which is said to average \$15 per ton, but which has not been worked, because of its sulphide character.

At the foot of the ridge, by the creek, on lot 1,087, are the mill and pump houses. The former contains a 40-stamp mill, with 450-pound stamps, and all necessary appurtenances; while the latter contains a large pump, used for pumping water to the reservoir, on top of the ridge. Twenty of the stamps are practically new. The mill is driven by water, from a dam across Yahoola creek, seventeen feet high, a 32-inch Leffel turbine wheel, furnishing 60 H.P., being used. When last rebuilt, the mill-house was planned, so as to admit of the introduction of a concentrating plant, for handling the sulphide ores. The pump was put up, new, by Mr. Wahl, the owner of the property, during the summer of 1895, at a cost of over \$8,000. The water is taken from the Findley ditch, something more than half way up the ridge, and is conducted to the large pump at the mill, through heavy iron pipes. The pump consists of eight cylinders, four of which are motor, and four, pumping cylinders. The water is supplied to the motor- and pumping-cylinders under equal pressure, thereby practically balancing the pressure on the discharge side, up the ridge to the point, where the ditch is located. The water, which is supplied to the motor-cylinders, is released at the proper point, actuating the pistons, in the same general way, as would steam or other power. The resulting power, applied directly, elevates the column of water to the reservoir, at the top of the ridge. The water, discharged from the motor-cylinders, is used, as battery-water in the mill.

The history of this property, as a gold mine, dates from a comparatively recent period. Lot 1,048, on which nearly all the mining operations have been conducted, was granted by the State to Talbot Davison, of Jones county, who sold it to James A. Paxson,

December, 1833. The deed given by Davison, to Paxson, was lost, and was never recorded. The first instrument of record is a power-of-attorney, given by Horace Lawrence to James A. Paxson in January, 1834, to sell an undivided fourth of the lot. In December, 1843, Lawrence, through Paxson, deeded this fourth, and Paxson, another undivided fourth, to Lemuel Dwelle of Augusta, Ga., this, and other property mortgaged, to revert to Paxson, on the payment of a note for \$549.00. In March, 1852, William Martin, Administrator of the estate of Richard G. Dunlap, sold an undivided fourth of this lot to Charles M. McJunkin, a wood-hauler; and, in May, following, McJunkin purchased another fourth from Bartley McGee. The court records do not show, from whom Dunlap and McGee got their titles to the property; and this led to subsequent litigation, when it was ascertained, that the lot had something more than a nominal value. While it would seem from the above, that deeds to an undivided half of the lot were held by Dwelle, and to the other undivided half, by McJunkin; still, I am reliably informed, that Paxson had mortgaged an undivided fourth of the lot to Mr. Germain T. Dortic of Augusta, Ga., to secure a note. While this transaction is not recorded in the office of the Superior Court Clerk of Lumpkin county; yet, there is recorded a power-of-attorney, given by Dortic, to Paxson, June 16th, 1859, showing, that Paxson recognized Dortic as the owner of an undivided fourth of the lot.

McJunkin, after having cut the wood from the property, sold his undivided half of the lot to James Jefferson Findley, in February, 1858. The deed, as recorded, does not mention the consideration in this transfer; but the statement is generally accepted, that it was an old horse, that had seen better days. Findley immediately sold a fourth interest in the lot to Boling W. Field; and, soon after-

wards, he secured the services of Charles Duncan, conceded to be one of the best prospectors in the section, to prospect the lot for gold. Duncan soon found a vein, with a small, but remarkably rich, shoot, which has since become famous, as "The Findley Shoot". It soon became known, in the neighborhood, that marvelous quantities of gold were being taken from lot 1,048; and Mr. Harrison W. Riley bargained with Capt. John Huff, that, if he would go, at once, to Augusta, and secure a lease of the half interest, held by Mr. Dwelle, and the fourth interest, held by Mr. Dortic, he would give Huff a half interest in the lease. Mr. Huff pushed through the country on horseback, as fast as possible, and secured the lease, on a royalty. By agreement, the shoot was worked jointly, by Messrs. Riley, Huff, Findley and Alex. Nix, for three or four months, all work ceasing, on their reaching water-level. The rich shoot in the vein was only from four to six inches wide, and from $1\frac{1}{2}$ to 2 inches thick; but it was so rich, that masses of gold, as large as a man's thumb, were not uncommon in the quartz. It is said, that the gold was carried away at night in a water-bucket. Mr. Huff, whose veracity I cannot doubt, told me, that he weighed a piece of the ore, and found its weight to be 1 lb. 11 ozs. He then beat it up, in a mortar, and found the weight of the resulting gold to be 11 ounces. The gold in this shoot was in pockets, and these were found, only now and then. The incline shaft made was four by six feet, sufficiently large to permit three men to work, at the same time.

Just before work was stopped, Paxson, who had allowed his note to remain unpaid, for fifteen years, having learned, that large quantities of gold were being taken from the lot, paid the note, held by Dwelle, on June 16th, 1859, and secured a power-of-attorney from Dortic, on the same day. He then brought suit against the mine

operators, to recover the royalties, leases etc. Having hunted up Mr. Davison, the original drawee of the lot, he induced him, to give him, August 10th, 1858, a new deed to the property, to take the place of the one, that was lost 25 years before. Paxson, then, sold the entire lot, in June, 1863, to The Stephenson Gold Mining Co.; and, about a month later, he deeded, as attorney for Dortic, the undivided fourth, which he had, previously, included in his deed to the company. In the meantime, Findley had sold the other fourth, belonging to him, to Field, in February, 1859. The suit, brought by Paxson, remained in court, all during the civil war; and it was compromised in 1866, Paxson getting the royalties, which he had already consumed in litigation. On July 9th, 1866, The Stephenson Gold Mining Co. sold the lot to Dr. Benjamin Hamilton, who, in turn, sold it to The Dahlonga Mining Co., a month later. In October of the same year, Mr. Field, still claiming the half, which had come through McJunkin, sold it back to Findley. Since that time, this claim seems to have been quieted, as it does not again appear in the history of the lot. I am informed, by a disinterested party, that, in 1869, when Mr. W. A. Ives bought the lot from The Dahlonga Mining Co., he employed Judge Geo. D. Rice, a prominent lawyer in the State, to clear the title to this and other properties; and, that this accounts for the Findley claim's not having been put forward, since. Dr. M. F. Stephenson, who organized The Stephenson Gold Mining Co., was its Manager. The last work, done on the shoot before the war, was stopped, it is said, by impure air in the shaft, which was then about 250 feet deep, on the incline. Dr. Stephenson, in beginning his work, decided to sink a shaft at the top of the hill, north of the shoot, until it was opposite the lower end of the incline, and then to drive a tunnel to strike the shoot. He sunk his shaft a hundred feet deep, and then drove

his tunnel, in a southeast direction, for about fifty or sixty feet, when he was forced to stop, on account of the scarcity of labor and the high price of powder, it being then worth \$2.00 a pound.

Work done, some time after the war by other parties, which is described, further on, proved that Dr. Stephenson, as he predicted, had ceased work, at only five or six feet from the shoot; but, that his tunnel, continued, entered the incline about the same distance above its bottom.

The Dahlonga Mining Co., who bought the property from Dr. Benjamin Hamilton in 1866, consisted of Mr. Wm. A. Ives, of New Haven, Conn., a gentleman by the name of Rider, from New York City, and a number of other friends of Mr. Ives, who resided in the North. Beyond preparatory work, nothing of any consequence was done, by this company, on the Findley mine. The most important operation was the running of a long tunnel, starting from a point near the middle of the hill, now the location of the lower cut, to strike the rich shoot at the bottom of the incline, a distance of about 500 feet from the point, where the tunnel was begun. After driving 300 feet, the project was abandoned by Mr. Amory Dexter, the Superintendent of the mine, on account of his having encountered a belt of very hard rock, and because of some dispute over the title. In June, 1869, The Dahlonga Mining Co. sold the property to Mr. William A. Ives, its President. The company had leased this and the Lockhart mines to Messrs. Crisson and Huff, in 1868; and their lease was continued under Mr. Ives. They confined their operations to the Lockhart property, until after the retirement of Mr. Huff, when Mr. Crisson, in the spring of 1871, removed the Lockhart 24-stamp mill to the Findley mine; and, having substituted new stamps for those, that were badly worn, he began mining operations on that property. In the spring of 1875,

Mr. Crisson secured an option on the two mines; and, the Findley lots 1,047, 1,048 and 1,087, he sold to Mr. James Farmer, Trustee for N. H. Hand, Price Bros. and James Farmer, for \$30,000. Mr. Farmer, as Trustee, sold the property, July, 1878, to The Findley Gold Mining Co., of New York City, for \$60,000. It was sold at sheriff's sale, in January, 1885, and was bid in, by Mr. George L. Nichols, for Mr. Spencer Trask and others.

During the time, when the property was under option to Mr. Crisson, Mr. N. H. Hand, who was interested with the former in the option, began to develop the property, so as to place it on the market. Mr. F. W. Hall was placed in charge of the work. He began, at once, to ascertain the most feasible way of ventilating the incline, and working the rich shoot. After securing valuable information from Dr. Stephenson, he decided to drive a tunnel from the Dexter tunnel to the bottom of the Stephenson shaft, and, after cleaning the débris from the shaft, to continue the Stephenson tunnel, to the shoot. He started his tunnel, about twenty feet from the end of the Dexter tunnel, in a belt of schist, much softer than that, in which the latter tunnel ended. The last blast, in the Hall tunnel, broke through into the Stephenson shaft, and a stream of water began to flow out; for the shaft was filled with water, earth, brush etc. After the flow of water had subsided, examination proved, that the bottom of the Stephenson shaft was four or five feet below that of the Hall tunnel. After the Stephenson tunnel and shaft had been cleaned out, work was resumed, where Dr. Stephenson left off; and, as has been before stated, five or six feet put them inside the Findley incline, about the same distance above its bottom. Mr. Hall tells me, that about \$3,000, in handsome free gold specimens, was taken out, and that a great deal more was left in place, the object of the work being, as before stated, to develop

the mine for sale. With these superb specimens, Mr. Hand induced Mr. James Farmer to come from Cleveland, Ohio, to examine the property. Not to be deceived, Mr. Farmer went into the shaft himself, and took from the vein, with a chisel, a gold miner's pan full of the quartz containing free gold. Having brought it out of the shaft himself, the gold was beat out by him in a mortar; and, being weighed, it was ascertained, that 546 dwts. of gold was the result. The sale was made, at once, Mr. Hand taking a third interest. Mr. W. B. Price, son-in-law of Mr. Farmer, and a banker in Cleveland, came down, to take charge of the mine himself. He worked the shoot, for a year or more, with great success, while the pocket lasted, after which Mr. Farmer, as I have before said, sold the property to The Findley Gold Mining Co., for \$60,000. A young man, a relative of a stockholder in this company, was sent down from New York, as superintendent. He was fresh from the mining school, and unwilling to take suggestions from the miners, experienced in the local conditions. He was not able to find the shoot, which had been lost; and, ultimately, he abandoned the work. He continued working in the open cuts; but, after about two years, work was stopped. Soon after this, Mr. George L. Nichols, Jr., Trustee, leased the mine to Mr. R. B. King. Mr. King, at once, went to work, to carry out certain conditions of the lease, in the way of repairs; and, then, he began mining the vein, and the rich shoot was almost immediately found. For certain reasons, the owners directed their attorney in Dahlonga, to have the lease cancelled; but, as Mr. King had faithfully complied with the conditions of the lease, the attorney informed them, that there was no ground, on which he could proceed. The lessee continued to mine the shoot, I am told, with unvarying success; when, just before his year's lease expired, he lost the shoot intentionally;

and he ever afterwards claimed, that he could find it again, at any time, so I am reliably informed. The Findley Gold Mining Co. continued to own, but not to mine, the property, until January, 1885, when it was sold to Geo. L. Nichols, Jr., Trustee, at Sheriff's sale, to satisfy a claim of \$5,500, held by Mr. Spencer Trask and others. Mr. Nichols, who was a relative, was acting for Mr. Trask, in the purchase. Five years later, in April, 1890, Mr. Nichols sold the property to Mr. Thomas J. Cheney, who purchased it for The Trefoil Gold Mining Co., of St. Louis, Mo., of which he was President. This company repaired the mill; and, changing the elevation of it, put in a set of concentrators, which, however, proved to be a failure. It is said, that they did some work in a long tunnel, the character of which I was unable to learn. Just a year later, the property was mortgaged to Mr. Robt. T. Stillwell, who, in July, following, sold it, through Mr. Wm. A. Charters, attorney, of Dahlonga, to Mr. Christian Wahl, of Milwaukee, Wis., its present owner. Since Mr. Wahl has owned the property, Capt. H. D. Ingersoll has been its manager, and, for the past year or two, its lessee. While no extensive work seems to have been done; yet the work on it has been constant; and, as stated, in the beginning of this report, the property is one of the best developed in the county.

During the time, when the property was being worked, under Mr. James Farmer, Trustee, and while Mr. N. H. Hand was, still, General Manager, a mill, known as the Little Findley mill, was erected on the northwest side of the ridge, well up towards its top, for use in milling the ore, brought by flume from the large cut, on top of the ridge. This cut had been started by Mr. W. R. Crisson, who was Superintendent of the mine, under Mr. Farmer. This mill was a 10-stamp Hall mill, which had been moved from the Lawrence mine in Dahlonga; it was run by steam. When The Findley

Gold Mining Co. came into possession, they enlarged the mill to 20-stamps, and increased the steam power, and put in pumps, to raise water from the Findley ditch, near by, to the top of the ridge, for use in working the upper cut. They, also, replaced the 24-stamp-mill, with the present 40-stamp mill.

The lower cut was begun, by Mr. W. R. Crisson, when he moved the 24-stamp mill from the Lockhart to this mine. The cut was, subsequently, worked by those following him. The veins, in this cut, were not in condition for examination, at the time of my visit, being covered by *débris*; but I am informed, that there are two large veins in the cut, which yield good returns.

THE LOCKHART MINE

As at present constituted, this property consists of that part of *lots 1,050 and 1,085, lying south and west of Yahoola creek, and the whole of 1,086, all in the 12th district.* The original Lockhart lot is 1,086; at times, the other lots, with 1,084, have been known, as the Singleton lots; and, when the several lots, with other properties, were purchased by The Dahlonga Co., Limited, the Singleton lots were included, under the title, "The Lockhart Mines." The Lockhart lot, 1,086, however, was, for a long time, included in the several transfers, only as a 99-year lease, which had been given by Eliel Lockhart to James A. Paxson, in June, 1866, Lockhart, in the instrument recorded, acknowledging Paxson to be the owner of an undivided fifth of the lot. Paxson transferred this lease to The Stephenson Gold Mining Co., in 1862, when he sold, as agent, a number of other properties to this company. From that time, the

lease was regularly transferred, with the sale of other lots, until 1,086 was attached by the sheriff of Lumpkin county, and sold, as the property of The Singleton Gold Mining Co., September 4th, 1884, to Samuel E. Griscom. By Mr. Griscom, the lot was deeded to Mr. Frank W. Hall, who sold it, including the Singleton lots, to The Dahlonga Co., Limited. Its subsequent ownership is the same, as that of the Bast mine, already given. In November, 1868, the sheriff of the county sold to Eliel Lockhart the fifth interest in the lot, belonging to James A. Paxson, to satisfy two judgments of the Court against Paxson; and, on the same day, Paxson, as well as the sheriff, deeded this fraction to Lockhart. Lot 1,086 was originally granted, by the State, to the orphans of Henry Sturgis, of Lincoln county. February 1st, 1843, an undivided fifth of the lot was sold by Valentine Weathers to Elizabeth Paxson; and, in December, following, it was sold by her to Lemuel Dwelle, of Augusta. On the same day, a bond-for-title was given by Dwelle to James A. Paxson; and a warranty deed was given by him to Paxson, June 16th, 1859. In March, 1849, A. M. Sturgis, administrator of the estate of John Sturgis, deceased, deeded the entire lot to Eliel Lockhart. Subsequent transfers of the lot have been given above.

The other lot of the present Lockhart property, on which mining operations have been carried on, is 1,085, adjoining 1,086 on the north. The Hamilton cut, on 1,086, lies by the side of tunnel No. 1, which was driven, along the lot-line, on 1,085. From this tunnel, as is elsewhere more fully described, the 12-foot vein was worked. Only a little distance further toward the northwest, are the East and West Crisson cuts. Quite near the line, separating the two lots, is the present Lockhart mill, on lot 1,085.

This lot, which was, for a long time, known as the Brand lot,

was granted by the State to Thomas Brand, of Walton county. In December, 1854, it was deeded by Brand to Harrison W. Riley, who sold it, in February, 1862, to Germain T. Dortic, President of The Stephenson Gold Mining Co. This company sold it, July 9th, 1866, to Benjamin Hamilton, who, in turn, sold a third of it to The Dahlonga Mining Co., and a half of it to The Hamilton Gold Mining Co., both deeds dated, August 7th, 1866. In September, 1867, that part, lying west of Yahoola creek, the part, in which the mines lie, was mortgaged and leased to The Dahlonga Mining Co., who operated it, for two years, when it was deeded by The Hamilton Gold Mining Co., to William A. Ives. To appreciate this transfer, it is necessary for me to say, that Mr. Ives was the principal owner of the stock in the two companies, above mentioned. As the promoter of these enterprises, he had interested some of his friends, in the North, on representations made by Dr. Hamilton, to such an extent, that they took stock in the companies formed by Mr. Ives. Finding, in 1869, that the titles to some of the properties were beclouded; and, not being willing, that his friends should suffer, thereby, he bought, from them, all the properties. He immediately set about, to clear the titles of all these properties, employing Judge George D. Rice, as counsel, as has been before told in this report. After clearing the titles, he disposed of his various properties. This lot he sold, with others, and the lease on 1,086, making up the Lockhart and Singleton properties, to Mr. William R. Crisson, who, in November, 1875, sold them to Mr. N. H. Hand, Trustee. In January, 1878, Mr. Hand, as trustee, sold the two properties, including the lease to 1,086, to Mr. Thomas H. White for The Singleton Gold Mining Co., of which he is said to have been President; and, about a month later, he transferred them to the company. From this point, the transfers of these lots are the same, as those of lot 1,086.

to the top of the hill, from a point on the Tan-yard branch, about a hundred yards beyond the middle Gainesville road. The water was used, to convey the ore through a flume, from the cut, to a bin at the foot of the hill, and to run the slates to a dump, by changing the position of the flume. The ore was carted to the mill, which was the one, erected by The Stephenson Co., in 1863, having wooden rods and stamps, the latter protected by cast-iron shoes, and a special device, in the nature of two 8-foot riffle-boxes, charged with mercury, for extracting the gold. The work by Messrs. Crisson and Payne was entirely open-cut work, except a little stoping, which was done on the vein, by Mr. Payne, just before the property was sold to the Hamilton and Dahlonega companies.

These companies began work, on an extensive scale, with Mr. H. Dwight Stanley, a nephew of Mr. Ives, as superintendent. A 24-stamp, cast-iron mill, with 750-pound stamps, was erected. This was the first iron mill ever put up, in this section of the country, and the first mill, that was equipped with amalgamated copper plates, for the extraction of gold from the pulp. Work was begun, by driving a tunnel, on lot 1,085, directly west from a point in the face of the hill, a few feet north of the Hamilton cut, till it encountered the 12-foot vein. The ore was then stoped out, on either side, along the trend of the vein, for a distance of about 75 feet, in all, the miners having reached, what they supposed was the end of the vein on the north side, and the cut, on the south side. Pillars were left in the stope, here and there, as a support. Overhead, the vein was stoped, for about 25 feet, and below the floor of the tunnel, for a distance of about 35 feet, this being twelve feet below water-level. A hand-pump was employed to keep the mine free from water. Both in the open cut, and where it was worked in the tunnel, the vein is said to have been twelve feet thick. Three pros-

pecting tunnels were started, by these companies, at the bottom of the east side of the ridge, about 200 feet apart, the most southern, which we may designate as No. 2, being a few feet north of the present mill, and the most northern, No. 4, having since become a part of the West Crisson cut. After two years of active operations, the companies, operated by Mr. Ives, stopped mining, and made a contract with Mr. W. R. Crisson, to deliver, at their mill, 700 tons of ore from the Hamilton cut, at \$1.50 per ton.

Subsequently, in the spring of 1868, the companies leased the mine, for an indefinite period, to Messrs. Crisson and Huff, for a royalty of a third of all the gold mined, the lessees, to keep the mill in good repair, and the mine in good shape. Mr. Huff retired from the business, about December 1st, 1870, selling his interests to Mr. Crisson. After their mining operations began, Messrs. Crisson and Huff worked the Hamilton cut, for only three or four months, transferring their work to the Findley Ridge cut, where they mined with good results, for over two years, some of the ore being worth \$5.00 per ton, but the whole, including some of the schist, averaging about \$3.00. In working this ore, the semi-decomposed schists were dug out with the pick, till the ore was well exposed, when the schists were flooded to the dump, and the ore, to the mill.

On discontinuing work on the Findley Ridge cut, the work of building a reservoir, on top of the Lockhart ridge, and a ditch, to supply it with water, was immediately begun, the water being taken from the Tan-yard branch, at a point about 75 yards west of the middle Gainesville road. As soon as these were completed, work was begun on the West Crisson cut,¹ Mr. Huff retiring from the partnership, at this time. At first, the ore was of very low grade;

¹ No. 4, on the sketch-map, fig. 26.

but, on going lower down, it proved better. The vein was covered with *débris*, so that I could not examine it; but Mr. E. E. Crisson, son of the lessee, informed me, that its strike was northwest and its dip, about 50° to the northeast. Work was begun on a ridge of hard, cellular, iron-stained quartz, outcropping at the top of the hill, and extending about 25 feet down its side, as a transverse lens, in the vein, its length being about twenty feet. On either side of the lens, the vein tapered to thin ribbons, which disappeared in the schists. Mr. Crisson informed me, that the foot-wall side of the lens was much the richer, the whole vein averaging, probably, \$3.00 per ton on the mill. The cut was opened and worked, nearly to the bottom of the hill, the ore changing, about half way down the hill, from a free-milling to a sulphide quartz, containing large quantities of pyrite. In the free-milling ore, considerable sulphur, in loose, minute crystals, with their angles generally rounded, as if partially fused, were found in the casts of pyrite crystals, resulting from the reduction of the sulphur in the pyrite. This is an occurrence, which cannot be said to be rare in Georgia. It has been mentioned by Mr. McCallie, in another part of this bulletin; and there are, in the State Museum, handsome specimens of the alteration, collected by me, in Haralson county, near Temple, on the Southern Railway.

This cut was worked, for nearly two years; but it was finally abandoned, by Mr. Crisson, because of his inability to work the sulphides with profit. On discontinuing work on this cut, a small test cut was made, on the west side of the Findley Ridge cut; but this was soon stopped, as the quartz was too low in gold.

Work was then begun on the East Crisson cut,¹ which lies immediately east of, and quite close to, the West Crisson cut.

¹ No. 3, on the sketch-map, fig. 26.

After the retirement of Mr. Huff from the firm, Mr. Crisson removed the pillars, which had been left in the stope in tunnel No. 1, by the companies under Mr. Ives's management; and, in doing this, he discovered, that there were several other veins back of, and nearly parallel with, the 12-foot vein. This work is said to have been very profitable. Mr. E. E. Crisson, son of the lessee, is authority for the statement, that 2,100 dwts. of retorted gold resulted from a clean-up, after one week's run. He says, that this was not an unusual thing.

Mr. Crisson continued work, as lessee of the property, till 1873, paying, it is said, thousands of dollars, as royalty to the owners of the property. Having, by this time, about exhausted the saprolite area in the Lockhart mine, he moved the mill over to the Findley mine, which had been included in his lease from Mr. Ives, continuing work there, until 1874, when the two mines were sold, through Mr. Crisson, to different companies. They have not, since then, been owned by the same company. The parties, to whom the Lockhart was sold, organized, as The Singleton Gold Mining Co. This company developed the water-power; erected a 20-stamp mill; and began to work the 12-foot vein, below the level of the tunnel, sinking the 55-foot vertical shaft in the mill-house. At this depth, they drifted, to strike the vein on its dip. It is said, that the vein was found, in this drift, to be equal, in size and yield, to that exposed in the tunnel. Drifts, on either side, were then run, along the trend of the vein, for about 50 feet; and the ore was then stoped out, to the old stope above, which had been abandoned by the two companies, working under Mr. Ives. This work seems to have been profitable; but, with increasing depth, the free-milling ore gave place to the unaltered sulphides, pyrite, chalcopyrite and pyrrhotite, and less of the gold was caught on the amalgamated

plates. Had the north drift along the vein been worked far enough, the rich shoot, known as "The 12-foot Arm" should have been encountered. This, however, was not done by the Singleton company; but the present lessees are drifting toward it.

During my several visits to the mine, this part of the vein was under water; and, notwithstanding several attempts were made to free it, in order that I might examine it and take samples, I was not successful in getting an opportunity to examine the vein. Mr. W. R. Crandall, M. E., a member of the American Institute of Mining Engineers, and a man, whom I consider reliable, made an examination of the property, after my visits, taking samples from this vein, along the drifts above mentioned. I have permission to present, here, the results of his assays, as follows:—

No. 2	-----	0.56 oz.	(\$11.20)	of gold per ton
" 3	-----	1.08 "	(\$21.60)	" " " "
" 4	-----	0.52 "	(\$10.40)	" " " "
" 5	-----	0.80 "	(\$16.00)	" " " "

No. 2 was taken from the middle of the vein, in the left drift, thirty feet from the shaft tunnel; No. 4, from the middle of the vein, in the same drift, forty feet from the shaft tunnel; No. 5, from the breast, in the same drift, where work is now going on; while No. 3 was taken from the vein, next to the hanging wall, in the right drift, thirty feet from the shaft tunnel, at the point, nearest the rich "12-foot arm".

As has been stated above, I was not able, at the time of my visit, to get into the shaft and tunnel, so as to examine the 12-foot vein; but I have been able to secure half a dozen large pieces of ore, aggregating 250 pounds, taken from different parts of the vein in the right drift, at a point 140 feet from the entrance at the shaft tunnel. This ore was not selected from the vein, with a view to

its use as assay material; but, as average specimens, for exhibition. I have taken, as a sample, for assay, these six specimens, which are in appearance typical of the material, taken from this vein.

When making the ore collection for the Georgia State Exhibit at the Atlanta Exposition, in 1895, two large specimens of ore were taken, by me, from the West Crisson cut, where they had been lying for a long time, exposed in the bottom of the cut. These weighed from 100 to 150 pounds each. Not being able to get fresh material from this cut, I sacrificed the smaller of the two pieces, in order to get an assay of material from this cut. While it is not what I should like, as a sample, yet, the results are suggestive. The samples taken, as above stated, were assayed in the laboratory of the Geological Survey, by Dr. Thos. L. Watson, with the following results:—

No. 1	-----	3.00	ozs.	(\$62.01)	of gold per ton
" 2	-----	0.20	"	(4.13)	" " " "

No. 1, from the right drift of the 12-foot vein, was rather coarsely crystalline schist, the prevailing mica being a dark-green chlorite. Garnets, the size of a filbert, were in some abundance throughout the mass, and pyrite and pyrrhotite were present in moderate quantity. No. 2, from the West Crisson cut, was a sulphide-quartz ore, considerably stained by partial decomposition of the pyrite.

As has been stated above, Mr. Crisson had abandoned hydraulicking, in the Findley Ridge cut, because the ore was getting too hard, to be worked by this method. Several short tunnels were driven, at intervals, in this cut, and the ore-shoots were found to continue downward; one, known as "The Blackmer Arm," proving unusually rich. Later on, in 1882-'83, a long tunnel was driven under this cut, a little to the east of it, beginning at the foot of the hill, in order to lay bare all the shoots, at greater depth.

For a distance of 150 feet, where work ceased, the tunnel exposed nothing but low-grade ore. From time to time, since then, other lessees have extended this tunnel, until it is now about 550 feet long, shoots of good ore having been found, at a distance of 350 feet from the entrance, though "the Blackmer arm" has not yet been reached. Along the 200 feet of good, average ore, the vein is from 4 to 6 feet thick; and it is said to yield on the mill, from \$3.00 to \$5.00 per ton. The ore, along the level of the tunnel, contains sulphides, in greater or less quantity, and the assay of Mr. Crandall's, which follows, would indicate that all the gold is not caught in the plates:—

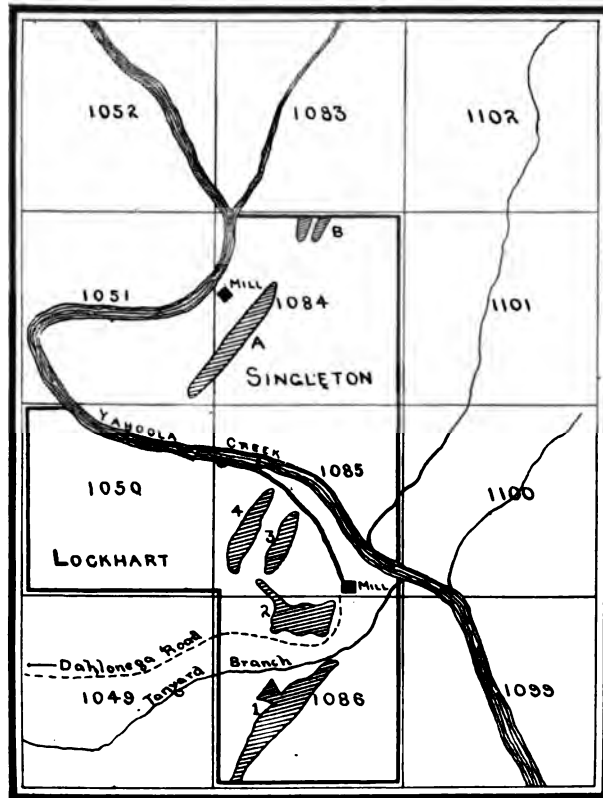
No. 1 0.72 oz. (\$14.40) of gold per ton

This assay is an average of ore, taken from the stope between this tunnel and the Stumon-Bell tunnel, above. Most of the ore from the lower tunnel has been milled; but the tunnel can be extended 650 feet further, to the south line of the lot, exposing a considerable quantity of ore; and deeper mining can be done, along the entire length of the vein.

The Findley Ridge cut begins at the top of Findley Ridge, at the east and west lot-line, between 1,086 and the Findley Mine lot, 1,087, about 150 feet from the southwest corner-post of the lot, on which it is located. This cut has a direction, N. 27° E., for between 1,100 and 1,200 feet, ending at the bottom of the ridge, near the Tan-yard branch. The trend of the cut is practically along the strike of the black slates, and diagonally across this black-slate belt. At the head of the cut, the slates strike N. 40° E., and dip 50° to the southeast. Lower down in the cut, the dip was measured 60° to the southeast. This cut was washed out, by water from a reservoir, about 100 feet from the cut, and almost on a level with the head of the cut. Its location is along the Findley ditch.

The dimensions of the reservoir are 100 feet long, by 12 feet wide, by 8 feet deep. At its widest point, the cut is about 70 feet wide, and its greatest depth is about 50 feet. The cut was started by

FIG. 26



Map of the Lockhart and Singleton Lots. 1. Findley Ridge Cut. 2. Hamilton Cut. 3. East Crisson Cut. 4. West Crisson Cut. A. Long Cut through the Singleton Hill, Consisting of the Singleton and the Moore and Cannon Cuts. B. Cuts on the Ridge Opposite the Singleton Hill.

Mr. F. M. Blackmer; and considerable work was done, after that, by Mr. Joseph D. Reid, Superintendent for Mr. Samuel E. Griscom,

of Philadelphia, the owner. Not far from the head of the cut, and northwest of it, a tunnel was driven, 6 or 7 years ago, along a large quartz vein, for about 75 yards. This vein outcrops, on the surface, in large white blocks; and it is 7 or 8 feet thick. Its trend is N. 3° E., and it dips 35° to the southeast.

By far the greatest amount of work in the Findley Ridge cut, was done by Mr. W. R. Crisson, as has been before related. At the time of my visit, no work had been done in the cut, for several years, and the vein was covered with *débris*; so that I was not able to see the vein, at the bottom of the cut, though a number of small veins were to be seen on the east wall, with about the same strike and dip, as the main vein. On the west side of the long cut, not quite half way up the ridge, is a small triangular-shaped cut, covering not more than 10,000 square feet, and averaging, in depth, about 15 feet, which is said to have been a test cut, made by Messrs. Crisson and Huff. Just above this, is to be seen the remnant of an old reservoir, which was used for working this and the lower part of the main cut. The schists, at the juncture of the two cuts, strike N. 5° W., and dip 30° to the northeast. On the south side of the triangular cut, is an apophysis of decomposed hornblende-schist, about 10 feet thick, conformable with the mica-slates, and having the same schistosity and dip, as has been before mentioned. On the north wall of this cut, is a large lens, in a very much broken quartz vein, around which the slates are arched, the arches being about four feet high, and about 15 or 20 feet long. This is at the juncture of the black, and the underlying yellow, decomposed schists. At a point, just northwest of this quartz lens, in another black belt, the slates strike N. 18° E., and dip, at an angle of 40° , to the southeast.

About 100 feet from the Tan-yard branch, is the 550-foot tunnel,

a little east of the Findley Ridge cut. About half way up the cut, is another tunnel, lying west of the first. This tunnel is about 150 feet long, and cuts the five-foot vein, at a point, between the bottom of the open cut and the long tunnel, below. This tunnel was started by Mr. Reid, and was used, for some time, as a flume-way, while mining in the cut. It was afterwards filled to a great extent; but it was re-opened by Messrs. Stumon and Bell, sub-lessees from Mr. W. G. McNelley, their tunnel changing direction, by veering to the east. From this tunnel, Messrs. Stumon and Bell stoped the vein overhead, for about 15 feet, and for some distance down, until the upward stope from the lower tunnel was encountered. The length of the stope, along the Stumon and Bell tunnel, is about 75 feet; while, in the lower tunnel, it is 100 feet. This vein lies between the schists. Its strike, as shown in the Stumon and Bell tunnel, is north and south, and its dip, 45° to the east. The work on the stope in the lower tunnel was done by W. G. McNelley, who took it up, where it had been left off by Mr. W. W. Crisson and his partner, Mr. Elliott, who drove the tunnel to the point, where the large stope begins. Mr. Jos. D. Reid, as superintendent for Mr. Griscom, had driven the lower tunnel about 82 feet, when Mr. E. E. Crisson, Mine Superintendent for The Dahlonga Co., Limited, drove it some distance, after which it was driven by Messrs. Crisson and Elliott to the stope, as above stated. About a year after the purchase of the property at sheriff's sale, by Mr. F. W. Hall, it was leased by Mr. W. G. McNelley, who began work in the lower tunnel, as before related, sub-leasing a working privilege to Messrs. Stumon and Bell, whose work was confined to the upper tunnel.

The schists in the upper tunnel were badly decomposed, while, in the lower tunnel, they consisted of folia of practically unaltered,

dark-green chlorite, in saccharoidal quartz, and of a light, greenish-gray hydrous mica, varying in different parts of the tunnel, the chlorite-schists and the hydro-mica schists appearing to be in different belts, following much the same order, as the so-called black and yellow belts in the saprolite. The dip of these slates was the same, as in the upper tunnel. The large stope is well timbered and lagged; and the vein, as seen along the sides of the stope, is beautifully banded, the quartz being interlaminated with slate, the bands of the former varying from one half inch to four inches, averaging about two and a half inches. This is a characteristic stringer vein. It was from this stope, that Crandall's assay No. 1, quoted by me, was taken.

The lower tunnel has a general direction north and south, varying, here and there, as it follows the vein. The first appearance of the vein is about fifty feet from the entrance; but it disappears, for a short distance, a little further on. It soon appears, however, very much spread out, the quartz bands being smaller and very much separated by schist layers. A few feet further, the tunnel has been stoped, a little on either side, along the vein; and, on the east side, at a point 15 feet above the vein, it consists mostly of quartz. From this point, the vein is, all along the side of the tunnel, about five feet wide, the quartz being more abundant, though much broken, with thin leaves of chlorite between the small blocks. The large stope, begun by Mr. McNelley, begins, at a point 475 feet from the mouth of the tunnel.

In the latter part of the year 1889, this mine was sold to The Dahlonga Co., Limited. An interesting story, which forms a part of the history of the mine, is related, in the description of the Bast mine. The Dahlonga Co., Limited, rebuilt the mill; but no mining was done. The property was bought at court sale, in the early

part of 1893, by Mr. F. W. Hall of Dahlonega, as has been stated in another part of this report.¹ Since that time, it has been leased by various parties, who have mined, in a small way, only.

From time to time, many concerns have operated on this property, some of which are not now in existence, while others were small lessees, who kept no regular account of their production. For this reason, it would be difficult, to even approximate the production of the property, during its past history. I am informed, however, that, during the first six months of 1895, when a record was kept, the lessees produced 3,231 dwts. of gold, valued at \$2,700, the ore coming from the long tunnel under the cut, and having a highly sulphide character. No attempt was made by the lessees to save the gold in the sulphides, the ore being run through a 20-stamp mill, and the gold, that was caught on the amalgamated plates, being all, that was saved. This ore is said to have averaged nearly \$5.00 per ton on the mill.

The Mill, on this property, is a 20-stamp mill, of the Hall type, with stamps, weighing 450 lbs. each. It is operated, by water-power, from a dam across Yahoola creek, a canal, 250 yards long, with a short 6-foot wooden tube, at the lower end of the canal, conveying the water to the mill. This dam was renewed in February, 1896. The 55-foot shaft, in the mill-house, is equipped with a geared hoist, run by a belt from a counter-shaft. A 7-inch pump is also used, both the geared hoist and the pump being operated by water-power. The motor, for running the mill, pump and hoist is a Rodney Hunt three-and-a-half-foot turbine wheel, of 75 H. P. The mill and its appurtenances are housed in a building, which is in very good condition.

¹ See page 371.

THE SINGLETON MINE

The Singleton mining property, as it is at present constituted, consists of *nearly all of lot 1,084, and about half, each, of 1,051 and 1,085*. The original Singleton lot was 1,084; while 1,051 was known as the Moore lot. The principal mining has been done on the Singleton hill, in two open cuts, which, though now running, one into the other, are divided by the north and south lot-line, between 1,051 and 1,084. So far as I have been able to learn, the first mining done on lot 1,084 was between 1840 and 1850, by Dr. Joseph J. Singleton, the first Superintendent of the branch mint at Dahlonga. It is said, that some prospect work had been done, before; but Dr. Singleton's work consisted, at first, of mining the veins, by tunnels and incline-shafts from the top of the hill. He, also, did some work, on the ridge, northeast of the hill, on what seems to be a continuation of the veins, running through the Singleton hill. Later on, Dr. Singleton started the open cut, on the northeast end of the hill. The mill, erected by him, was a wooden 12-stamp mill, run by an undershot wheel, with water from a dam across Yahoola creek. This mill stood between the northeast end of the hill and the ridge opposite, at the point indicated in fig. 27. Dr. Singleton died in 1852; and work, for the time being, ceased on that end of the hill and on the ridge opposite. At the time he was working the mine, Col. R. H. Moore and Mr. John Cannon were working the same veins, on the other end of the hill, on lot 1,051, using the same mining methods, as were used by Dr. Singleton. Their mill was a wooden 4-stamp mill, which stood down at the creek, just opposite the open cut, in the southwest end of the hill. Nothing more than "gouging" was done on this property, from the



HYDRAULIC MINING IN THE DECOMPOSED AURIFEROUS SLATES, WITH THEIR VEIN CONTENT, AT THE SINGLETON MINE, DAHLONEGA, GEORGIA.



time it was worked by Messrs. Moore and Kennon, until 1860. The Moore and Kennon cut was, for a short time, after this, called the Boston mine; and Mr. Walter B. Smith, who owned an undivided two-thirds of the lot, was its Manager. A new wooden 8-stamp mill was put up, in place of the old Moore and Kennon mill; but operations were soon stopped, by the beginning of the war, in 1861. Nothing of any consequence had been done on the Singleton end of the hill, until 1866, when Mr. John Huff did some prospecting for Mr. William A. Ives, President of The Dahlonega Mining Co., who had become the owners of the property. In the meantime, in 1860, the heirs of Dr. Singleton had sold an undivided two-thirds of the lot to Mr. A. M. Eastman, who, subsequently, sold it to Dr. Benjamin Hamilton, the other third having been sold, by Mr. David T. Singleton, to Mr. Harrison W. Riley, in January, 1856.

After the close of the civil war, Mr. W. R. Crisson began work in the Moore and Kennon cut, and continued for some time, flooding the ore from the cut to a bin, and then carting it to the Lockhart mill, where the gold was extracted. About the same time, Mr. F. M. Blackmer was working on the Singleton cut, at the other end of the hill, employing the same methods of mining, as were being used by Mr. Crisson. He enlarged the cut, considerably. After Mr. Blackmer stopped, Mr. Joseph Reid began work, in the cut, and opened it, to within a short distance of the Moore and Kennon cut. Mr. Reid worked, for about three years; but, after his work ceased, the property lay idle, for a number of years. His method of working was the same as that of Mr. Crisson, namely, excavating the material with a pick, and flooding it from the cut, though Mr. Reid ran his material through a flume, direct to the Singleton mill, instead of to a bin. This old mill was removed to the Ralston mine, in 1889. Subsequent to the work, done by Mr. Reid, the Singleton

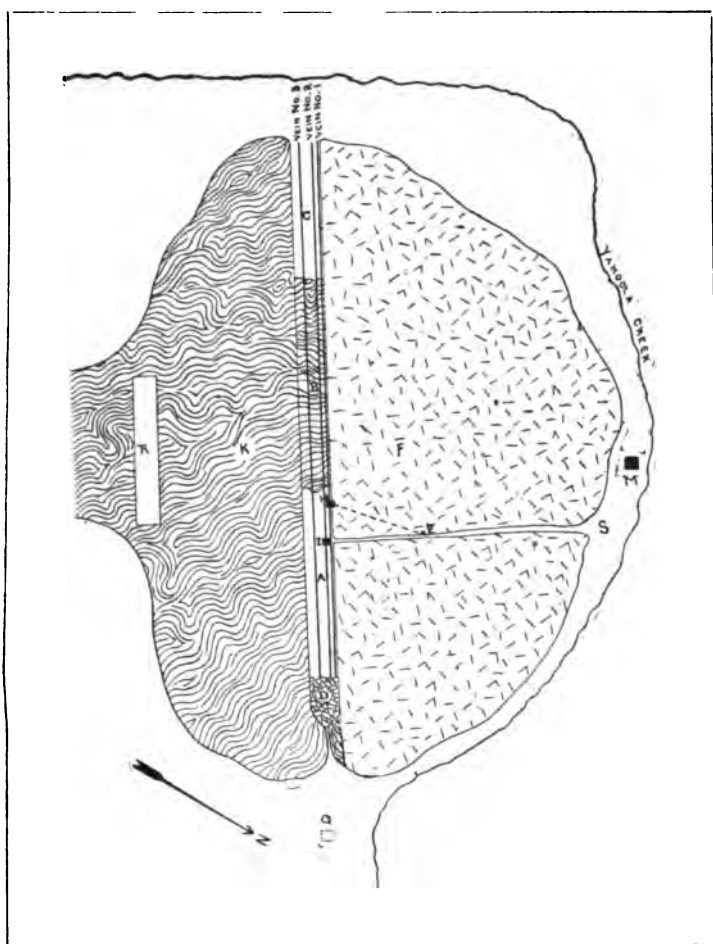
was consolidated with the Lockhart property, and was sold to The Singleton Gold Mining Co.; and, in 1889, the two were sold, as the Lockhart property, to The Dahlonga Co., Limited. In 1893, the several properties, as has been, before, related, were bought at sheriff's sale, by Mr. Frank W. Hall, who separated the properties, as stated in another part of this report, so that the Singleton property should consist of that part, lying north and east of Yahoola creek.

At the time of my visit to the property, the Singleton hill had been extensively cut, longitudinally, by excavations, which had been dug deeper at either end of the hill, the saprolite extending further down on the ends, than at the center of the hill. At these ends, the cuts were about sixty or seventy feet deep, on the southeast side; but, between the cuts, was a mass of semi-decomposed schists, too hard to be worked by flooding or by the giant.¹ The schists in this cut were, of themselves, very slightly, if at all, auriferous; but three distinct veins extend the entire length of the hill, and appear on the ridge, about a hundred yards northeast of, and opposite, the Singleton cut, where work had been done on two small open cuts, extending north to the line of the Tahloneka lot, the veins continuing on into this lot. In appearance, the decomposed schists are gray, and totally unlike the schists of the so-called yellow and black belts. Bands, of a dark-green chlorite, resulting from the alteration of biotite, and others, of a highly feldspathic gneissoid granite, occur, here and there, among the mica-schist bands. Alongside of vein No. 1,¹ lies the southeastern border of a dike, which forms the northwest half of the hill. Through this, an open cut, about 350 feet long, with a direction, N. 45° W., was made, in June, 1896, from the Singleton cut, down to the north edge of the hill, for a

¹ See figs. 27 and 28.

flume-way to the mill. This cut shows the dike to be almost solid hornblende-schist, though, near the point of contact with the mica-

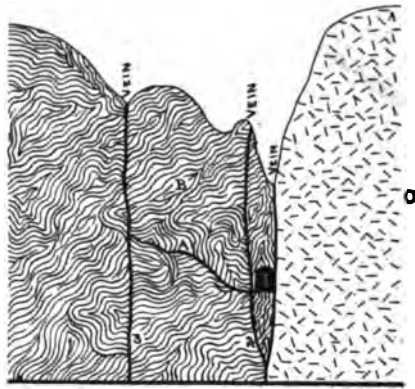
FIG. 27



Sketch of a Horizontal Projection of the Singleton Hill. A. The Singleton Cut. B. Semi-decomposed Mica-schists between the Two Cuts, only partly Removed. C. The Moore and Kennon Cut. D. Rock-pile. E. Mouth of Projected Tunnel. F. Hornblende-schist. G. Site of Old Mill. H. Shaft on Vein No. 1. I. Shaft on Vein No. 2. K. Mica-schist. M. Site of Mill. R. Reservoir. S. Flume-cut.

schists, there are included a few narrow bands of decomposed mica-schist. On the west side of the hill, between its base and the creek, is a bed, consisting of several acres of auriferous gravel, which was mined, to some extent, by a Philadelphia company, who leased the property from The Dahlonega Co., Limited. This deposit extends up the hill, for fifteen or twenty feet, the creek seeming to have shifted downward.

FIG. 28



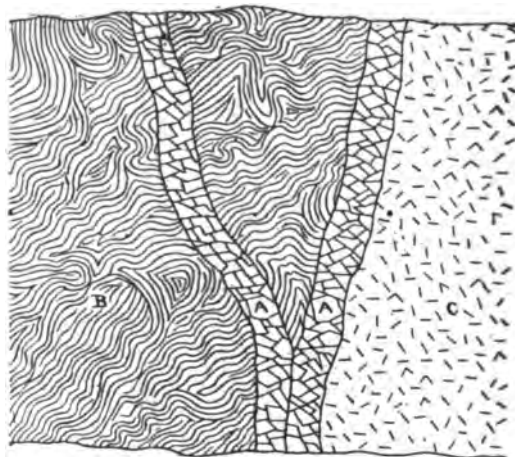
Sketch of a Vertical Transverse Section through the Rocks, at the West End of the Singleton Cut. A. Floor of the Cut. B. Semi-decomposed Micaceous Schists, between the Singleton and the Moore and Kennon Cuts. C. Hornblende-schists. T. Entrance to Tunnel. 1, 2 and 3. Auriferous Veins.

The veins, in the Singleton cut, were being worked by Capt. Weaver, at the time of my visit; but no work was being done, at the other end of the hill, nor on the ridge opposite the Singleton cut. A tunnel had been run from the Singleton to the Moore and Kennon cut, along the contact between the hornblende- and the mica-schists. Fig. 27 is a sketch of the horizontal projection of the hill. Vein No. 1, at the bottom of the cut and the entrance to the tunnel, was eight inches wide. Eight feet southeast, was Vein

No. 2, which had the same width, and was parallel with the first, along the floor of the cut. Vein No. 3, about twenty feet further southeast, is a stringer vein, composed of small lenses and ribbons of quartz, with the mica lying in between, the entire width of the vein being about two feet. About fifty feet east of the tunnel entrance, on the northeast side of the flume cut, an incline had been driven down on vein No. 1; and, at the bottom of the incline, which was about twenty-five feet deep, the vein was three feet wide, and included some mica-schist. The vein is imbricated in the front part of this incline. This condition caused it to be lost, on one occasion, and work on it was stopped. Capt. Weaver subsequently found it, only eighteen inches south of where the former work had ceased. Here and there, this vein is quite rich in free gold. Above the entrance to the incline, just referred to, and a few feet further towards the northwest, some ore, very rich in free gold, was taken out, during the period, in which I was examining the property, a short incline, about parallel with the one below, being sunk on the vein. Here, the vein warps slightly from its vertical position, the top part dipping, at a smaller angle, to the southeast. At the top of the lower incline, the vein pinches out; but it again appears in the upper one, where it is, from two to three feet wide, on the floor; but it again disappears, on the roof of this incline. The vein includes, here much crumpled, partially decomposed gneiss, which is gold-bearing. The quartz is very cellular, and is stained dark-brown, by iron-oxide, which sometimes coats it. Between the upper and lower incline, is another, which was opened many years ago, and which has long been completely filled. About ten or twelve feet from the entrance to the tunnel, a shaft, eighteen feet deep, was sunk on vein No. 1, during the period, covered by my examination; and it was found, that the two 8-inch veins, Nos. 1

and 2, had come within a few inches of each other,¹ at that depth, though they were eight feet apart, at the bottom of the open cut. At a point in the flume-cut, indicated in fig. 27, by the letter E, Capt. Weaver had begun to drive a tunnel through the hard hornblende-

FIG. 29



Sketch of a Vertical Transverse Section through the Schists in the West End of the Singleton Cut, Showing the General Position of Veins Nos. 1 and 2, from the Floor of the Cut to the Depth of Shaft H, 18 Feet. A. The Veins.
B. Mica-schist. C. Hornblende-schist.

schist, which he supposed would end, about fifty feet below this shaft. The dotted line, E — H, in fig. 27, represents this unfinished tunnel.² A second shaft, he had sunk ten feet deep, about thirty feet further east, on vein No. 2. This vein, at a depth of ten feet, had widened, till it was two feet thick. The quartz, at this depth,

¹ See figs. 28 and 29.

² Since the Tahloneka Mining Co. has been operating this property, they have completed this tunnel, and sunk the shaft to the bottom of the tunnel. I am informed, that the veins separate, come together for the second time, and again separate.

was white, and of low grade. At the time of my examination of the property, Capt. Weaver was working the three veins, by blasting, excavating with the pick, and washing, by flood runs from the reservoir, through the flume to the mill. He mined and milled the decomposed mica-schist, along with the vein matter, though the schists contained very little gold. The ore in the veins consists, generally, of a saccharoidal quartz, containing pyrite, pyromorphite and galena, with considerable free gold, in places. Where more than a foot wide, considerable mica-schist is included. The pyrite is the most abundant of the minerals mentioned; though the ore cannot, so far, be said to be highly pyritiferous. The pyromorphite occurs in crusts, on which, frequently, can be seen small crystals, of the usual modified hexagonal type; and the galena, in occasional dark clouds and lines through the quartz, though at times, small cleavage masses are discernible. Now and then, a small mass of chalcopyrite is to be seen. In the parts of the veins, above the floor of the cut, the pyrite is decomposed, and the quartz is very cellular, and much stained by the resulting limonite. It is in this kind of quartz, that the free gold is most abundant.

Samples for assay were taken by me, from all three veins,¹ in the Singleton cut. These yielded results as follows: —

No. 1	-----	0.35	oz. (\$ 7.23) of gold per ton
" 2	-----	2.40	" (\$49.61) " " " "
" 4	-----	0.95	" (\$19.64) " " " "
" 5	-----	0.20	" (\$ 4.13) " " " "
" 6	-----	1.45	" (\$29.97) " " " "

No. 1 was taken from vein No. 2, along the vein, near the entrance to the old tunnel, and from the bottom of shaft 1, ten feet

¹ See fig. 27.

below the floor of the cut. The quartz, from near the tunnel, was cellular and iron-stained; while that from the shaft, was massive, white, and of acknowledged low grade. No. 2 was taken from vein No. 1, along the vein, near the entrance to the tunnel, and from the upper and lower inclines, beyond the flume-cut. It was from the upper incline, that so much free gold ore was taken, while I was examining the property. The ore of this sample was mostly cellular, iron-stained quartz. Sample No. 4 was taken from the bottom of shaft H, where veins Nos. 1 and 2 come together. The ore contained the undecomposed sulphides, pyrite and galena, the latter very sparsely. No. 5 was taken from vein No. 3, in the west end of the cut. This ore consisted of mica-schist and quartz stringers, both of which are said to be auriferous. No. 6 was taken from the same vein, in the Moore and Kennon cut, at the other end of the hill.

The ore, taken from the upper incline, was so rich in free gold, that I took a sample of selected material for assay. While much of the quartz in this sample showed free gold, much of it did not, my object being to get a fair sample of the richest ore, and not merely those specimens, which showed much free gold. All the quartz was cellular, iron-stained, saccharoidal, and very friable. The material was sampled by me in the laboratory. A part of the sample was turned over to The N. P. Pratt Chemical Laboratory, for assay, and another part, to Messrs. George P. Good & Co., Mining Engineers and Metallurgists, of Atlanta. Each assayed the ore in duplicate. The Pratt Laboratory obtained results, as follows:—

No. 3. Original sample	-----12.675 oz.	(\$261.99)	of gold per ton
“ “ Duplicate	-----12.775 “	(\$264.06)	“ “ “ “

Messrs. Good & Co. reported the following, as their results:—

No. 3. Original sample-----13.050 oz. (\$269.74) of gold per ton
“ “ Duplicate-----12.910 “ (\$266.85) “ “ “ “

During the litigation, in which The Dahlonga Co., Limited, owners of this and other mines, was engaged, Capt. John W. Weaver, as receiver, operated the Singleton mine, his receivership extending from May, 1891, to March, 1893. He produced during this time, with only a few hands, \$6,311.49. When the properties were sold, he leased the Singleton mine, from Mr. Hall, on condition, that any mining operations should be, for the development of the property. Under this restraint, I am reliably informed, that Capt. Weaver has produced, during the last two-and-a-half years, \$7,000, at an expense of \$30.00 per week. Notwithstanding the restrictions, some sub-lessees from Capt. Weaver, during the time, covered by my several visits to the property, mined from fifteen to eighteen tons of the ore in the cuts, adjoining the Tahloneka lot; and these yielded a return, on the mill, of 364 dwts.

The placer area of the Singleton mine lies on lot 1,051, northwest of the lower end of the large cut, indicated on the map.¹ About two thirds of it has been mined; but subsequent submergence, from time to time, has completely obliterated all evidence of work, except at those higher points, near the foot of the hill. It is believed, that the part, which was formerly worked, by the crude methods of that day, will pay for re-working. The water from the reservoir on top of the hill, is available for working this deposit, with hydraulic giants. The hydraulic elevator would be required in mining the lower parts of the placer.

In 1890, The Dahlonga Co., Limited, transferred a 10-stamp mill, of the Hall pattern, with stamps weighing 450 pounds each,

¹ See fig. 26.

from the Bast to the Singleton mine, and erected the present mill-house, which is in good condition, and sufficiently large, to accommodate ten more stamps. A Leffel cascade water-wheel, with a diameter of 26 inches, and of 30 H.P. capacity, is the motor, which supplies the driving power for the mill.

The device for saving the gold consists of two 4-foot amalgamated copper plates, with sand-boxes at the foot of the plates, leading into two riffle-boxes, 4 feet long by 18 inches wide, which, in turn, empty into two "quick-traps"; at the end of these is a long riffle-box, running the width of the mill-house, 28 feet. Another riffle-box, 36 feet long, at the end of this, and on the outside of the house, is the last of the series. From this, the battery water and tailings, together with the water, which passes through the racks of the ore-bin, empty into the creek. All the boxes are charged with mercury. Behind the batteries, on the side, next to the hill, is a sufficient ore-bin, from which the mill is fed by hand. One side of the bin consists of a vertical rack, through which the flume-water, used, to bring the ore from the cut, flows out of the mill-house.

The ditch, which supplies the Singleton mine with water, was dug by Mr. W. R. Crisson, in 1867, under a charter to The Crisson Water-power and Mining Co., of Dahlonega. The source of water supply is the headwaters of Ward's creek and its branches. The ditch was originally dug three feet wide at the top, two feet wide at the bottom, and eighteen inches deep. It was enlarged, by The Dahlonega Co., Limited, to four feet wide, at the top, three feet at the bottom, and two feet deep. It brings its water, sixteen miles, to a reservoir on top of the Singleton hill, a few feet above the top of the Singleton cut, though, on an air-line, the head of the ditch is not more than five miles from the mine. The ditch

delivers about 100 miner's-inches of water.¹ It is said, by a competent engineer, that, if the ditch and flumes are enlarged, Ward's creek will supply 200 miner's inches, which will furnish 90 H.P.

Lot 1,084 was granted by the State to John Molton, Jr., of Marion county. It was deeded by John T. Molton, to Terrell and Montfort, in May, 1837. About a month and a half later, in June, David Montfort and David Terrell sold an undivided half of the lot to Joseph J. Singleton, and the other half was sold to him by Terrell, in November, 1841. In January, 1856, about four years after the death of Dr. Singleton, David T. Singleton, one of his heirs, sold a third interest in the lot to Harrison W. Riley. In January, 1859, the administrators of Dr. Singleton deeded this and other lots to A. M. Wallace and David T. Singleton. An undivided two-thirds of this lot, besides sundry other lots, were, by these persons, deeded to Arthur M. Eastman, March, 1860. In February, 1862, Harrison W. Riley sold his undivided third of the lot to Germain T. Dortic, President of the Stephenson Gold Mining Co.; and, in June, 1863, this company bought the other two-thirds, with other lots, from Benjamin Hamilton. His ownership, at this time, is not apparent in the county records; but in July, 1866, this two-thirds of 1,084 with other lots, was deeded to Hamilton, by Arthur M. Eastman, and, in August following, Hamilton deeded them to The Dahlonga Mining Co. From this point, the ownership of this lot is the same, as that of 1,050 before given.

The other lot, 1,051, on which mining has been done, formerly known as the Moore lot, was granted by the State, in the lottery of the Cherokee country, in 1832, to John Collins, of Columbia county, who sold it, in December, 1853, to Robert H. Moore, for many years one of the most prominent mining men in the county, and,

¹ Equal to 1,200 gallons, per minute.

during the civil war, a Colonel in the Confederate army. In July, 1854, Mr. Moore sold the lot to Charles I. Kane, Simeon M. Johnson and Isaac H. Smith. In August, following, Mr. Johnson sold his undivided third to Robert L. and Fulton Cutting. In July, 1860, a quit-claim deed was given, by Robert H. Moore to Walter B. Smith, to all right, title and interest in lot 1,051. In September, 1860, Charles I. Kane gave to Walter B. Smith a quit-claim deed to his interest in the property. A mortgage, to two thirds of the lot, was given by Mr. Smith to Harrison W. Riley, in April, 1861; but that interest was afterwards sold, by the sheriff, to Mr. Riley, as the result of a suit of Evan Wilde against Walter B. Smith, Oct. 1st, 1861. In December, following, an undivided third of the lot was sold, by the sheriff, as the property of Walter B. Smith to James M. Whelchel, to satisfy a judgment of the Court, in the suit of John Whelchel against Walter B. Smith. There is no record of any transfer of this third, by James M. Whelchel, or by any one, representing him, since that time; and it is probable, that the judgment, if satisfied, at all, was satisfied in some other way. In May, 1862, Wm. S. Roberts, President of The Augusta and Dahlonega Mining Co., purchased the two thirds interest in the lot, belonging to Mr. Riley; and on the 3rd day of the next month, he purchased the same interest, at sheriff's sale, in the case of Harrison W. Riley against Walter B. Smith. The undivided third, belonging to the Messrs. Cutting, was sold by them to Benjamin Hamilton, July 27th, 1866; and, about ten days later, this and the two thirds, belonging to The Augusta and Dahlonega Mining Co., were sold to The Dahlonega Mining Co., warranty deeds being given, in both cases. In June, 1869, this lot was purchased from The Dahlonega Mining Co., by Wm. A. Ives. From this time, the ownership of lot 1,051 is the same as that, of 1,085, already given, except, that,

from the time of sale of the properties, by William R. Crisson to N. H. Hand, only that part of lot 1,051, lying east of Yahoola creek was conveyed; as Mr. Hand had previously bought, from Mr. Ives, that part of the lot, lying west of the creek, for a mill-site.

The Singleton property still belongs to Mr. F. W. Hall of Dah-lonega.¹ Since it has been owned by Mr. Hall, it has been under lease to Capt. John W. Weaver, the former receiver of the property, while in litigation. Mr. Weaver worked it for expenses, during the litigation; and he has done much work, as lessee, since then, paying a royalty to Mr. Hall.

THE TAHLONEKA MINE

This property, consisting of *lot 1,083, 12th district*, and known, until recently, as THE GOWDY LOT, lies adjacent to the Singleton lot, 1,084, on the north. The veins of the Singleton mine, which have been worked, on the ridge opposite the Singleton hill, extend into the Tahloneka lot. Notwithstanding this, little work has been done, on this lot; and that has been entirely of a prospecting character. A shallow shaft was sunk, some years ago, by Mr. Joseph D. Reid; and some other work of a similar nature, was done. Occupying the position it does, in the trend of the veins of the

¹ As is stated in a preceding foot-note, this property was sold, in 1897, to Messrs. Jno. B. Atkinson and others, who have, since, formed themselves into The Tahloneka Mining Co., of Earlington, Ky., and have made large preparations for aggressive work, making use of modern methods and machinery.

Singleton, and in the heart of the gold belt, it is somewhat surprising, that this lot has received so little attention.¹

The Baker lot, 1,082, is, now, a part of the Tahloneka property.

Lot 1,083 was granted by the State to Alexander McDuffy of Hall county. On May 13th, 1833, an undivided half was sold, by Thomas Holland and James Gowdy, to Jonathan Jewitt, conveyance being by a warranty deed. A mortgage, to this and other lots, was given by Holland and Gowdy to Paul Rosignol, in September, 1833. In August, 1838, James Gowdy sold an undivided half of the lot to David Holiburton. In June, 1841, the sheriff of Lumpkin county sold to Charles S. Hamilton, a resident of Vermont, the half belonging to Jewitt, to satisfy a judgment of Court, in favor of Maurice Gould & Co., against Jonathan Jewitt. This half was again sold, by the sheriff, in May, 1881, to H. H. Quillian, for unpaid taxes for the year 1880; but it seems to have been redeemed by Mr. Hamilton, as the entire lot was next sold, Oct. 15th, 1886, to Mr. W. P. Price, by Commissioners, appointed by the Superior Court of Lumpkin county, to sell the lot, in order to make a division between Allen L. Pease, administrator of the estate of Charles S. Hamilton, deceased, and Mrs. E. A. Gowdy, widow of James Gowdy. By Mr. Price, it was conveyed, by war-

¹ Since my field-work was finished, in the fall of 1896, this lot has passed through the hands of several parties; and it is now owned by The Tahloneka Mining Co. It was bought by Judge W. W. Murray, soon after my field-work closed; and he began extensive prospecting. He sunk the Reid shaft much deeper, and did other work of investigation and development. The Tahloneka Mining Co. has continued this work; and it is making preparations to work the mine, in connection with the Singleton mine, adjoining. The two mines are, now, under the name of the Tahloneka Gold mines. A large specimen of the ore from this mine, showing free gold, was donated to the Georgia State Museum, in July, 1897; and it is now on exhibition in the Museum collection.

ranty deed, to G. W. Lindsey, September, 1888, who likewise conveyed it, Sept. 13th, 1893, to N. C. Lindsey, its present owner.

THE HAND MINE

This mine is located on *lots 999 and 1,032, 12th district*, all the mining having been done on the latter, the open cuts covering, probably, as much as six acres. With the exception of the Barlow mine, no mine in the county has been so extensively worked, for its saprolite and the included vein material; but the work has been confined entirely to surface mining. The most extensive cut, which really consists of a number of adjacent cuts, the partition walls of which have been taken away, is *The Hand Cut*, in which lie the Knight and Antonio veins. It is said, that the mills on this lot have been running continuously, for thirty years; and this may be readily believed, when one views the vast cuts, from which the saprolite has been excavated.

The Griswold Cut lies well up on top of the hill, in the northeast corner of 1,032, not far from the Yahooola cut, on 1,052. In this cut, is what is known as *The Griswold Vein*, which lies near the east and west lot-line, between 1,031 and 1,032, and quite close to the northeast corner of the latter. The part, which has been worked is a lenticular mass of quartz, about fifty feet long, twenty feet thick, and of unknown width, work not having progressed far enough, to determine its width. Along the wall of the cut, the vein, at either end of the lens, narrows to one or two feet. A 20-foot incline, at an angle of 60° towards the north, was sunk several years ago, under the direction of Capt. H. D. Ingersoll, General Manager

of the mines of the company, now owning the property. This incline failed to reach the lower end of the lens. At that time, water from the reservoir was constantly coming into the incline; and the ore being of a sulphide character, not enough gold was saved on the plates, to justify continuation of the work, with the much larger percentage of gold going off with the sulphides in the tailings. The incline was, therefore, abandoned. I am informed, that the last assay of this ore, made by the company's assayer, yielded a return of \$6.00 per ton. The shaft was filled with water, at the time of my visit to the property; and I was not able to take material for assay from this vein, though sufficient of it was exposed, along the more elevated inside wall of the shaft, for purposes of description. The material, here, was a cellular quartz, much stained by iron-oxide, resulting from the decomposition of the pyrite. Laminæ of mica were included in the quartz, parallel with the trend of the vein. It was quite evident, from the character of the material at the top of the incline, that, lower down, the vein was of a highly sulphide character. The saprolite and included quartz from this cut had been worked, by flooding from the reservoir above, and with the hydraulic giant, the material being run through a flume to the mill.

Vein No. 1 is near the bottom of the hill, not more than a hundred yards from the mill. It has been recently discovered and opened to view, by Capt. Ingersoll. The cut, thus far made, in working this vein, is about a hundred feet long by sixty feet wide by forty feet deep. The work has been done with the hydraulic giant, in "piping", and in washing down, to the mill, the ore, which has been broken into small blocks by the miners. The vein, as well as the soft decomposed schists is greatly contorted, as viewed along the wall, normal to the trend of the vein. As a result of this disturbance, the quartz occurs in irregular, discontinuous masses, evi-

dently twisted out of their original position. The trend of the vein is N. 10° E., and its dip, 65° to the southeast. The quartz is banded, parallel with the trend of the vein, and is slightly stained by iron-oxide, resulting from the decay of the pyrite, which is present in small occasional masses, varying from the size of a small bean to $1\frac{1}{2}$ by 2 inches. Very little mica occurs in the quartz, and then, it is arranged in lines, parallel with the vein; but, as at present exposed, "horses" of mica-schist, irregular in outline, and as long as six or eight feet, by two or three feet wide, occur in the vein.

The Pruitt Vein has been exposed at two points — in the bottom of an open cut, where it has been worked along its trend, and at a point a little west of this cut, higher up on the vein. No exposure was to be seen in the cut, as the vein had been covered by débris, since it was last worked; but the exposure, a few feet west of the cut, was very good; and I took a sample across the entire vein. The trend of the vein is north and south; while its dip is 45° to the east. Its thickness is twenty feet, with bands of mica-schist included in the quartz. The quartz is curiously banded, parallel with the trend of the vein, a narrow band of yellow, transparent, glassy-looking quartz, alternating with a white, porous, finely saccharoidal quartz, which is still further divided by exceedingly thin laminæ of mica, barely perceptible, at first glance. These bands vary, generally, from a sixteenth to a half-inch in thickness, the bands of white, porous quartz being uniformly wider, than the other. The quartz is sometimes cellular, and is generally stained by iron oxide; and considerable pyrite, in masses, the size of those mentioned, above, in the description of Vein No. 1, occurs throughout the vein. It is sufficiently pyritiferous, to be classed as a sulphide ore. Like all the other veins, observed on this lot, the Pruitt.

is composed of large quartz lenses, connected by much narrower quartz bands. The length of the lens, from which my sample was taken, and which I have here attempted to describe, was about fifty feet.

About 150 yards west of the Hand mill, and in full view from the road to the mine, is *The Knight Cut*, now included in the immense excavation, known as *The Hand Cut*. At the rear of the Knight cut, hardly more than fifty yards from the road, is a large quartz lens, known as *The Knight Vein*, which has been worked, for many years, from time to time. This lens is about 200 feet long, and twenty feet thick, along its shortest axis, the length of the longer lateral axis not being known. Like Vein No. 1, this lens includes irregular "horses" of mica-schist; longitudinal with the trend of the vein. In the bottom of the cut, the exposed surface of the vein is but little lower than the road. On the north wall of the cut, at the farther end of the lens, the vein separates into four veins, from 8 inches to two or three feet in width. These veins have been cut, in another part of the lot, and have been worked, in connection with the surrounding schistose saprolite, in what is known as the Jackson cut. The trend of the vein, as shown in the Knight cut, is N. 65° E., and its dip, unusually steep, is 80° to the southeast. Like the other veins observed on the lot, it is intercalated in the mica-schists. The character of the ore is identical with that of the Pruitt vein, on the hill above. I took an assay sample from across this quartz lens, in the bottom of the cut, at a point, where it was 15 feet wide, a "horse" of mica-schist, five feet wide, being omitted.

A shaft in the Knight cut was sunk eighty feet deep, some time ago, at the end of the lens, next to the road; but it is now filled. Here, is still a large wooden overshot wheel, which was used to run

the pump, that kept the shaft free from water. Just behind this wheel, is the entrance to an old tunnel, that was driven, 200 feet, by Capt. Ingersoll, some time ago, under *The Old Hand Cut*, across the strike of the schists. A vein, ten feet thick, was cut, at the mouth of the tunnel; another, six feet thick, thirteen and a half feet further; a third, eight and a half feet thick, ten feet further; a two-and-a-half-foot-vein, thirty-four feet further; and a fifth, twenty feet thick, was cut, twenty-five-and-a-half feet from the last.

This was *The Antonio Vein*. There is a good exposure of this vein, along the irregular floor of the Old Hand cut, about sixty feet above the surface of the Knight vein in the bottom of the Knight cut. This exposure consisted of a lenticular mass of quartz, trending transversely across the cut, its trend being N. 80° W., and its dip, 40° to the southeast. Along the floor of the cut, it was twelve feet thick, while in the tunnel below, as above stated, it was 20 feet. The most of this vein consisted of a massive, translucent, gray quartz, very little stained by iron oxide, and containing no pyrite, or other visible sulphide; though, here and there, a few cavities, stained by iron oxide, and resulting from the alteration of pyrite, were observed. Next to the foot-wall of the vein, the quartz was, for about two feet, of the banded kind, which has been observed in the Knight and Pruitt veins; but the white bands were much wider, being, in some cases, as much as an inch or more in width. On the west wall of the cut, the vein was about two feet wide. An assay sample from this vein, was taken by me, across its thickest part, exposed in the cut.

The several samples, which I took, have been submitted to assay, in the laboratory of the Geological Survey, by Dr. Thomas L. Watson, Assistant Geologist, with the following results:—

No. 1-----	A trace only of gold per ton
" 2-----	0.250 oz. (\$ 5.17) " " " "
" 3-----	0.275 " (\$ 5.68) " " " "
" 4-----	0.575 " (\$11.88) " " " "

No. 1 was taken from Vein No. 1, all along the exposed part of the vein for 100 feet. The character of the sample was the same, as that of the ore from this vein, described above. As has been stated before, this is the only vein now being worked, on the property; and the mill results are sufficiently encouraging, to justify a continuation of work. The above result of assay was, therefore, a surprise. The assay was first made, in duplicate, on an assay-ton of ore, with the same result from each. Two assay-tons were then used, without change of result; and then four assay-tons, with the same result. No. 2 is from the Pruitt vein; No. 3, from the Antonio vein; and No. 4, from the Knight vein. The method of taking, and the character of the ore, of each, are described above.

Lot 999, belonging to the Hand mine, has been prospected to some extent, the principal work being the excavation of a long, narrow open cut, across the strike of the schists, by Capt. Ingersoll, in order to see the character of any veins, that might be cut. But none of the material from this lot has been milled.

The Hand Mill is located on lot 1,051. It consists of twenty stamps, weighing 450 pounds each, with motor power from a 26-inch Wilder turbine wheel, developing 30 H. P., the water for which is furnished by the creek, through a canal, from a dam on lot 1,052. This canal conveys the water to both the Hand and the Yahoola mills. This mill is the type of the Hall patent, devised by Mr. Hall, when Superintendent of The Yahoola River and Cane Creek Hydraulic Hose Mining Co.

The history of this mine is full of interest; but it can be but briefly dwelt upon, in this report.

Lot 1,032 was granted by the State to John Aiken, of Pike county. It was sold by Aiken, through his attorney, William Ezzard, in June, 1833, to James Milborn, who, on the same day, transferred two-thirds of the lot to Reuben Cone and William Ezzard, both of Atlanta, then Marthasville. In September, 1835, James Milborn deeded $13\frac{1}{3}$ acres of the lot to Mathias Milborn, who, in August, 1836, transferred this third to William Ezzard. In December, 1853, William Ezzard made a conditional deed of all this lot, to George R. Hazwell; but the conditions were probably not fulfilled; for, in December, 1873, William Ezzard and Julius A. Hayden, Harriet Eliza Hayden and Sarah S. Ezzard, heirs-at-law of Reuben Cone, sold all of 1,032 to Nathan H. Hand, who transferred it to THE HAND AND BARLOW UNITED GOLD MINES AND HYDRAULIC WORKS OF GEORGIA, in July, 1890, this company being the present owners of the property, with their general office at 100, Prospect Ave., Milwaukee, Wisc.

About the year 1845, a man, whose name was Knight, began working for gold in that part of the lot, which has since been known, as the Knight cut. To what extent his operations were carried, I was not able to learn; but, in 1846, while at work in a tunnel, which was driven into the east wall of the cut, on a vein parallel with the Knight vein, the roof caved in, and he was killed. Work on the lot was continued by various persons, in a small way, from the time of Knight's death, till Dr. Van Dyke arrived in Dahlonega, in the fall of 1858, privilege to work the lot being leased from Judge Ezzard, of Atlanta. While 1,032 seemed to be the lot, on which The Yahoola River and Cane Creek Hydraulic Hose Mining Co., of which Dr. M. H. Van Dyke was General Manager, had determined

to do their principal mining; yet they were able, only to lease the lot. Dr. Van Dyke erected a wooden 8-stamp mill, near the road, at the mouth of the Knight cut, to be run, with water from the ditch. The ditch-water he brought, in a box, down hill, from terminus of the ditch, on the east side of the creek, at an altitude of 250 feet above its surface, to a trestle, which he built up, 128 feet high, from the banks of the creek, below. Across this trestle, he carried the water, which entered the temporary ditch, described elsewhere in this report,¹ at an altitude 122 feet lower, than the ditch, on the east side of the creek. Both the mill and the ditch were completed, a short while before the civil war began; and operations were carried on, from that time to some time after the war had begun. The condition of affairs brought about by the war, however, finally compelled Dr. Van Dyke to cease work, which he did about 1863, when it became necessary for his superintendent, Mr. Amory Dexter, to enlist for service in the war. From this time, nothing was done, until after the close of the war, in 1865. Dr. Van Dyke was still connected with the company. In October, 1865, Mr. Harvey King was made Treasurer and Clerk; and the directors made arrangements with Mr. King, who was a man of considerable means, that he should advance money for mining purposes, the company to repay all these advances, certain stock in the treasury of the company being held as security for Mr. King. The company worked other properties besides this lot, doing considerable placer work on the Todd lot, No. 930, and on the Parker lot adjoining, along the public road from Dahlonga to Auraria. Under the management of Messrs. Van Dyke and King, immediately after the war, the wooden box, leading down to and across the trestle, from the ditch, on the east side, was taken out, and

¹ See p. 312.

36-inch riveted pipe of boiler-iron was substituted for it. The pipe, after crossing the trestle, was carried up the hill, to a point opposite the ditch on the east side, with an elevation of nearly 250 feet above the creek, thus forming a U-tube. From this point, a new ditch was dug to lot 1,032, the same size as the ditch beyond the creek, viz., six feet across at the top, five feet at the bottom and three feet deep. Considerable money was spent, in the extensive preparations for mining and in the mining itself, amounting, in October, 1867, to nearly \$40,000. Mr. N. H. Hand was, at this time, elected to succeed Mr. King, as Treasurer, the latter having voluntarily resigned; and he was appointed General Superintendent and Agent of the company, at a Directors' meeting, two weeks later. The Directors made arrangements with Mr. Hand, similar to those, which they had made with Mr. King, as to advances of funds, for mining operations. In November, 1868, the tall trestle, upon which the ditch-water was brought across the Yahoola, had so far decayed, that it could not be further used, unless expensive repairs were undertaken. Mr. Hand had induced Mr. F. W. Hall to come to Dahlonega; and he was made Superintendent of the milling and mining operations, and, a short time thereafter, he was elected Clerk of the company. In the early part of 1869, Mr. Hall removed the trestle, and remodeled the iron pipe U-tube, bringing it down, along the surface of the hill, on the east side of the creek, to about 20 feet above the bank of the stream. He then carried the tube across the creek, on well-built stone piers, about twenty feet high. The tube was then carried up the slope of the hill, on the west side of the creek, to the head of the ditch, an altitude of about 250 feet above the surface of the stream. While the boiler-iron of the pipes, high up on the hillsides, was only 3-16 of an inch thick, it was found necessary, to double the thickness, for the pipes lower down,

so as to withstand the pressure of the water. This, a distinguished engineer, of Boston, insisted, the pipes would not do ; but, for nearly thirty years, they have done so, causing no trouble, whatever.

Mr. Hand, on assuming the management of the company's properties, tore down the old wooden stamp-mill, built by Dr. Van Dyke, before the war, and erected an iron 20-stamp mill, having 650-pound stamps. This mill was erected, on the branch, just west of the site of the dwelling-house, now standing, and about 150 yards southwest of the present mill. It was erected, during the winter of 1867-'68, work on it having been begun, in November. It was of a western pattern, with high discharge, wide mortars and inside amalgamated plates, in addition to those, below each battery. The mill, being completed, mining operations were begun, in the old Knight cut, mining the ore dry, and carrying it in a car over a tram-way. It was soon ascertained, that, owing to the high discharge and the inside width of the mortars, not enough ore could be handled to make the work profitable. It was then, that Mr. Hall was employed to take charge, under Mr. Hand, of all the operations, with instructions from the company, to make extensive experiments, in order to ascertain, what changes could be made in the mill, to adapt it to the class of ores, they were handling. Mr. Hall increased the height of the dies, thereby lowering the discharge ; placed the screens back near the stamps ; removed the inside amalgamated plates ; and, by further experiments, produced the mill, now patented as the F. W. Hall gold-mill. After these changes, much better results followed. A greater percentage of gold was saved by the old mill, than by the remodeled mill ; but the capacity was as 1 to 4 ; and the yield from the latter was much greater. Contemporaneous with the changing of the mill, was the substitution of the hydraulic method of transpor-

tation, for the tram-car. Another excellent device was added to the mill, which aided greatly in saving the ore. It is known, as a "jack-plate." The ore coming through the flume into the ore-bin, was caught on a perforated iron-plate, placed horizontally in a wooden sluice-box, about 14 inches high, midway between its top and its bottom. Below the plate, the box converged to a short and narrow mouth, the sides of which were on a level with the iron plate. This emptied into another box, about six feet wide, by 14 feet long, by 12 inches high, across which 10-inch boards, set up on edge, were placed equidistance apart, forming four or five compartments, in which to catch the sand and gold, which had been washed, by the water, through the perforated plate. The water passed off, after having left its coarse ore, sand and other solid matter on the perforated plate and in the sand-box. The washed ore was shoveled from the iron plate into the bin, and was fed to the mill; and the sand was fed from the compartments to the batteries of the mill opposite them, the "jack-plate" being placed in the rear part of the ore-bin, parallel with the batteries of the mill. I was informed by Mr. Hall, that the two batteries opposite the sand-box invariably produced more gold, than the two, opposite the iron plate, which were fed with the coarser ore.

For some time, trouble had been brewing in The Yahoola River and Cane Creek Hydraulic Hose Mining Co.; and, about the beginning of 1871, Messrs. T. C. A. Dexter, M. H. Van Dyke and others, representing a minority of the stock, brought suit, in the shape of a bill in equity, in the United States District Court in Atlanta, to dispossess Mr. Hand, and get control of the property. This suit was decided against the plaintiffs; but, later, Mr. Hand voluntarily surrendered the property, and brought suit against the company, to recover the amount of money advanced by him —

something over \$60,000. Mr. F. W. Hall, to whom certain salary was due, likewise brought suit, to recover the amount due him; and it was on this suit, that the property was sold, subject to the judgment in favor of Mr. Hand. The property was bought by Mr. Hall, for Mr. Hand, who organized, in the latter part of 1873, a new company, known as THE HAND GOLD MINING CO., of which he became President and General Manager.

Work was continued, on lot 1,032, by this company, from its organization to some time, about July 1st, 1890, when it was consolidated with the mining interests of the late S. L. M. Barlow, including the Barlow mine, into THE HAND AND BARLOW UNITED GOLD MINES AND HYDRAULIC WORKS OF GEORGIA, of which Mr. Hand was also President. This company continued work on lot 1,032, and other properties belonging to it; but, in 1892, the personnel of the company changed, Mr. Christian Wahl, of Milwaukee, and others purchasing the stock of the company. Since then, the mine has been under the management of Capt. H. D. Ingersoll, General Manager of the mines, owned by this company; and it has been almost continuously worked.

THE YAHOOOLA MINE¹

The Yahooola Mine is located on *lot 1,052, 12th district*, along the west bank of Yahooola creek. The entire property consists of *this lot, and 1,031 and 1,053 adjoining*, which were formerly known as the Benning lots.

In the fall of 1858, Dr. M. H. Van Dyke, of New York, came to

¹ Field-work by S. W. McCallie, Assistant Geologist.

Dahlongega, to look into the mining prospects, and see, if mining investments could be profitably made. After spending some time in his preliminary examination, he organized The Yahoola River and Cane Creek Hydraulic Hose Mining Co., of northern capitalists, and began the construction of the large mining ditch, now known as "The Hand Ditch," but, for many years, as "The Yahoola Ditch."

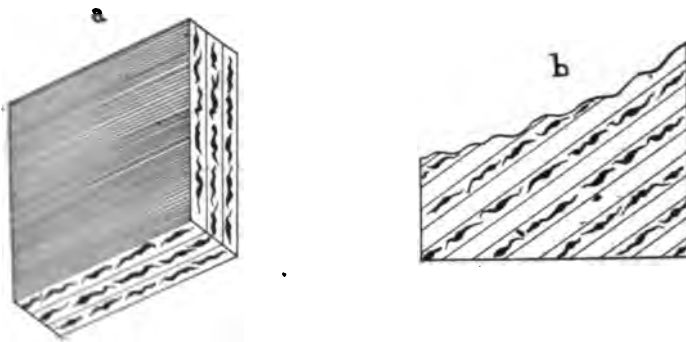
In 1860, Dr. Van Dyke bought, for the company he represented, lot 1,052, and leased 1,032, lying diagonally adjacent on the southwest; and the Yahoola ditch was brought to the latter. But little work was done on either, before the war.

In the days of "the intrusion," 1829-'31, lot 1,032 was looked upon, as one of the best gold lots in the county; and it is said, that large quantities of rich ore were taken from the part of this lot, east of Yahoola creek, by trespassers from the white colony, encamped near Murrayville in Hall county. Strange it is, that, since the lot has been systematically worked for gold, all the work has been confined to the west side of the creek. Very little work was done on this lot, until some time after the close of the civil war, most of the operations having been confined to 1,032, which had been leased from Judge William Ezzard, of Atlanta. In 1870, the present mill-house was erected by Mr. F. W. Hall, under the management of Mr. N. H. Hand; but no mill, or other machinery, was introduced, until 1886, when Mr. Hand put in the present 20-stamp mill.

The work done on the lot covers two or three acres along the hillside, sloping to the creek, the highest point being about 150 feet above the creek. At the time of Mr. McCallie's examination, the property was not in good condition for such work, no regular mining having been carried on, for some time, with the exception

of a small amount of work, which had recently been done, by Mr. Marion Chester. Nevertheless, it was evident, that the property could be put in good shape, for a comparatively small amount of money. The work consisted of several large cuts, varying in depth from twenty to seventy feet; also, a number of prospect shafts. The material, worked, was principally the schistose saprolite and its quartz content. These had been worked with the hydraulic

FIG. 30



Ideal Sections through the Auriferous Schists. a. Sections along the Strike and Dip, with the Ore-bodies in Black. b. Vertical Section.

giant. The vein matter consists of quartz and gneiss, forming belts (called "blankets," by the miners) and lenticular ore-bodies, in the mica-schists, which themselves are more or less auriferous, especially near the ore-bodies. The latter are quite cellular, especially the quartz. But, as greater depth is attained, the cavities give place to pyrite and chalcopyrite. Black tourmaline also occurs.

The veins and ore-bodies all dip with the schists, at an angle of about 30° , and, usually, in a direction $N. 70^{\circ} E.$ The country-rock is mica-schist with belts of gneiss and hornblende-schist. The mica-schist contains much biotite, and it is, consequently, of a dark

color. It is much contorted and faulted. The mica-schists often contain garnet and pyrite, the latter being usually auriferous. The gneiss lies, in sheets or walls, in the mica-schist. It is of light color, and, usually, very fine grained; but, occasionally, it passes into porphyry. Chlorite and large scales of mica are frequently found between the mica-schist and the gneiss, but more commonly along the veins or the joints. Both the schists and gneiss are cut, by two or more systems of joints, dividing the rock masses into huge blocks, many feet across. These aid the miner in getting out his ore.

The mine is supplied with all necessary iron pipe, hydraulic giants etc.; and it gets water from the Hand ditch, for hydraulic mining.

Samples for assay, taken by Mr. McCallie, yielded results, as follows:—

No. 1	0.03 oz. (\$0.62) of gold per ton
No. 2	0.11 oz. (\$2.27) " " " "

No. 1 was taken from a shaft on the "Sulphuret vein," near the Hand lot; while No. 2 was from an excavation near the creek.¹

The Mill is located on the creek, a short distance from the mine. It is a 20-stamp mill, of the Hall patent, with stamps weighing 450 pounds each. The motor is a turbine wheel, with a 12-foot head, furnished by the creek, which, except in unusually dry seasons, never fails to furnish water, sufficient to operate the mill, day and night. Only five stamps are, at present, in operation; but the others are in good condition. The main building is about 45 feet

¹ Since this field-work was done, Capt. Ingersoll has put the mine in good condition, and several handsome gold-bearing veins are, now, well shown, among them a large vein, rich in sulphides, known as The McAfee Vein.

square, and of the usual height, containing the mill, ore-bins, amalgamated plates etc. A new roof and other slight repairs are needed.

Lot 1,052 was granted by the State to Alfred Allison of Greene county. In April, 1844, it was sold by the sheriff, as the property of Thomas Moseley, to satisfy a judgment of the Court, in the suit of Benjamin T. Moseley against Thomas Moseley, William C. Dawson becoming the purchaser. September, following, Dawson gave Gwynn Allison a quit-claim deed to the lot. In January, 1860, it was sold by Allison to M. H. Van Dyke, who, in May, following, deeded it to The Yahoola River and Cane Creek Hydraulic Hose Mining Co. In August, 1873, it was sold, by the sheriff of Lumpkin county, to N. H. Hand, at the suit of Frank W. Hall against The Yahoola River and Cane Creek Hydraulic Hose Mining Co. In April, 1874, Mr. Hand gave to The Hand Gold Mining Co. a quit-claim deed to this and other lots. It was sold by the sheriff to The Hand and Barlow United Gold Mines and Hydraulic Works of Georgia, January 5th, 1892, to satisfy a Court judgment, in favor of N. H. Hand and others against The Hand Gold Mining Co. It is still the property of the company purchasing it, at that time. The main office of this company, of which Mr. Christian Wahl is President, is No. 100, Prospect Ave., Milwaukee, Wis. The General Manager of the several properties, owned by this company in Lumpkin county, is Capt. H. D. Ingersoll, Dahlonega, Ga.

THE MARY HENRY MINE

This mine lies, along the Upper Gainesville road, just opposite the first mile-post, on *lot 1,030, 12th district*; though the mill and

one of the veins lie on the southeast side of the public road. The Mary Henry property includes, also, *lot 1,001*, which adjoins 1,030, on the west. The property is owned by several Tennessee gentlemen, and is organized, as THE GOLD MOUNTAIN MILL AND MINING Co., of which Judge W. W. Murray, of Huntingdon, Tenn., is President. The mine bears Mrs. Murray's given name.

There is one principal vein on the lot, northwest of the public road. Very early in the third decade of the century, a man, known as Col. Adam Peck, worked this vein, by tunnels, and took out a small amount of ore, which, I am credibly informed, was very rich in free gold. Very soon after his work was stopped, Mr. John R. Cochran began work, in the same way; and he claimed to have taken out considerable gold. A number of very old tunnels were observed on the lot; but, except the work done by the two, named above, I was unable to ascertain, whether or not others worked the lot, prior to the civil war. It is very likely, however, that a number of small lessees worked it, from time to time.

Not a great deal of work has been done on this property, of late years. In the southeast corner, on the southeast side of the public road, is a quartz vein, said to average four feet in thickness. It outcrops, from the top of the hill, flanking Yahoola creek on the south, down to the bottom of the hill, near the creek; and it, again, appears on the hill, on the east side of the creek. It lies parallel with the schistosity of the micaceous slates. The outcropping of this vein, on the east side of the creek, is but poorly shown in Plate XVII, a little to the right of center, as it lies in between the slates. The vein may be located, by the débris leading from it. At about 15 feet from the bottom of the hill, the vein curves sharply to the northwest, for about 20 feet, and again resumes its normal trend. The first curve may be seen near the top of Plate XVII. The vein

is four feet thick, at the point, seen in the plate; but, a little higher up the hill, at another opening, it is 16 feet thick. It is parallel with, and only forty or fifty feet from, a large 20-foot quartz vein, containing considerable pyrite and chalcopyrite, on lot 1,053 of the Yahoola property, known as "The Benning Vein". The vein, under discussion, is near the Mary Henry mill; and, for purposes of description, I shall call it *The Mill Vein*, and the open cut, through which it has been worked, *The Mill Cut*. The trend of this vein is directly north, and its dip, about 50° to the east. That part, on the south side of the creek, has been worked by open cut. About two-and-a-half years ago, Mr. Marion Chester started the cut, working the vein under a lease, for about a year and three-quarters. The cut, at the time of my visit, was about 200 feet long, extending from the top to the bottom of the hill, and forty feet wide by 25 feet deep, the vein lying between the slates in the bottom of the cut, but entirely covered by soft, decayed schists, which had fallen in, since it was worked. I was informed by Mr. Chester, that, for 15 feet from the surface, the ore was free-milling, hard quartz, with some cellular, iron-stained quartz all through it, and that the ore averaged from \$6.00 to \$8.00 per ton on the mill. From that point, the character of the ore began to change to a sulphide-quartz; and, soon after, the company refused to allow further work to be done on the vein, as its mill was not fitted, for saving the gold from the sulphides. Mr. Chester worked the cut, by flooding the ore, with water from a reservoir on top of the hill, 90 feet long by eight feet wide by four feet deep. The upper end of the cut stops at the lot-line between 1,031 and 1,032, the former being one of the Yahoola lots, on which a cut has, likewise, been worked to the line, so that the two now form one continuous cut, the same vein having been worked on both lots.



AURIFEROUS QUARTZ VEIN BETWEEN HYDROMICA SLATES, MARY HENRY MINE,
DAHLONEGA, GEORGIA.



On the northwest side of the road near the creek is a tunnel, driven under the direction of Judge Murray, this summer, in a northwest direction, into the foot of a hill, to cut a large vein, known as *The Big Sulphuret Vein*. An old tunnel, which Judge Murray, in prospecting, about seven years ago, had discovered on the south side of the hill, and reopened, led to the finding of this vein, the quartz of which is more heavily impregnated with auriferous pyrite, than any I have seen in the county. The vein lies between the soft, decomposed mica-schists, and consists, at the juncture of the two tunnels, of a large lenticular mass of sulphide-quartz and decomposed mica-schist. The length of the new tunnel is about forty feet; while the old is only twenty feet long. I was unable, to find out anything of the early history of the old tunnel, as its existence had passed out of the knowledge of men. It was evidently abandoned, on account of the highly sulphide character of the ore, which, until recently, was very undesirable, in the estimation of the miner. The top of the ore-body is about fifteen feet from the floor of the present excavation, and its length is about forty feet. About 350 tons of the ore were mined, 300 of which were milled, while the company was prospecting the vein. This ore is said to have yielded about four pennyweights of gold per ton, on the mill. The auriferous pyrite increasing with depth, and the free-milling ore proportionately decreasing, Judge Murray decided, to waste no more of the sulphides, which were all lost in milling.

Lying over the lenticular ore-body, and with the same dip, as the underlying schists, is a hard, gray quartzose slate. The bottom of the lens has not been reached; and its extent, downward, is not known; nor has its thickness been determined; for the hanging-wall has not been reached. Still, the excavation is from twelve to

fifteen feet wide. About a hundred yards west of this work, higher up on the hill, with the entrance from a small cove, a tunnel, 96 feet long, was driven, about 1891, by Judge Murray, in a southwest direction, to cut what is known as *The Black Vein*, which had been worked, many years ago, through an incline from the top of the hill, by whom or when, I was unable to ascertain. Encountering the vein, at the end of the old incline, work was continued, in the same direction, along the strike of the vein, passing beneath the tunnel, and generally along its trend. From the point, where the new work was begun, a quartz lens, 40 feet long, 15 feet wide and 5 feet thick, was taken out and milled, the ore, it is said averaging a little over \$4.00 per ton on the mill. After work had proceeded, for about 25 feet along the incline, a shaft was sunk through the floor of the tunnel, and the ore was hoisted through it. This shaft is thirty feet deep. The vein, along the lower wall of the incline, averages about a foot thick. The ore of the lens was an iron-stained, hard quartz, much broken into blocks, and containing but little mica; but, near the bottom of the lens, it changed to a sulphide-quartz, pyrite being somewhat abundant. This is the character of the ore, now exposed in the vein.

The strike of the vein is east and west, and its dip, 40° to the south. The semi-decomposed mica-schists, in the shaft and incline, strike north and south, and dip, at an angle of 45° , to the east. The slates, over-lying these, are beautifully banded, decomposed quartzose slates, described on page 290. It is through these slates, that this tunnel is cut, its entrance being crossed by a small granite dike, mentioned on page 289. This dike trends N. 20° E., and dips, at an angle of 30° , to the southeast. The decomposed quartzose slates have the same direction and dip, as the dike. This tunnel is known as *The Black Tunnel*.

About 200 feet west of the Black tunnel, a little higher up the hill, is an old tunnel, of unknown origin. Judge Murray had it cleaned out, last June,¹ for a distance of about fifty feet, in a direction, N. 45° W., when a fall of eight feet was encountered, and a 20-foot drift was entered, which had been cut, due north. In this drift, was a twelve-inch vein of pyritiferous quartz, trending with the drift, and dipping with the mica-schist, as far as could be seen, at an angle of 30°, to the east. The tunnel, which I designate as *Tunnel No. 3*, is driven through the same banded, gray, decomposed quartzose slates, as were encountered in the Black tunnel. As is the case with the other ore-bodies described, these slates lie over this part of the vein and its enclosing mica-schists.

Samples for assay were taken by me from all the openings described, except the vein in the Mill cut, which, as before stated, was covered by fallen débris, and the vein at the bottom of the incline below the Black tunnel. When I went, prepared to take my sample from this point, there had been a small cave, and the vein was covered with water. Opportunity, later, did not offer. The assay results were, as follows:—

No. 1	.....	0.050 oz.	(\$1.03)	of gold per ton
" 2	.....	0.160 "	(\$3.31)	" " " "
" 3	.....	0.075 "	(\$1.55)	" " " "

No. 1 was from the Mill vein, on the north side of the creek, as shown in Plate XVII; No. 2 was from the Big Sulphuret vein; and No. 3 was from the vein in Tunnel No. 3. The character of the ore has been described above.

The Mary Henry mining property presents striking differences, in comparison with other properties in the district. It has lenticular ore-bodies, like the Hand mine; but the ore is of a very differ-

¹ June, 1896.

ent character. These ore-bodies, while enclosed in mica-schist, are overlaid by quartzose slates, unlike the slates seen elsewhere in the district, these outcropping, for several hundred yards, along the Upper Gainesville road, which passes through the southern edge of the property. The hornblende-schists, so common in the district, are notably absent; and granite dikes, known to occur nowhere else around Dahlonga, are present, on this property. I am of opinion, that the mine openings, on the north side of the road, are all on one vein; and that the variations, in the trend of the lenticular ore-bodies, are purely local and normal; and that the general trend of the vein is almost east and west. The ore is a handsome sulphide ore, especially that, from the "Big Sulphuret vein"; and I must confess myself disappointed, in my assay results, though, of their integrity, there can be no reasonable doubt.

No mining work has ever been done on lot 1,001, the other lot, belonging to the Mary Henry property.

The Mary Henry Mill consisted of fifteen stamps, when the prospecting operations were in progress, four or five years ago; but, since then, ten stamps have been removed to the Preacher mill. As it stands, at present, the mill is of a western pattern, with five stamps, weighing 850 pounds each.¹ It has an eight-foot amalgamated copper plate, below the battery; and it is provided with a Gates ore-crusher and an automatic feeder. The ore is delivered from cars, which come, over a tram-way, to the upper story of the mill, in the floor of which is the hopper to the crusher, from which it is fed, directly through a gate, to the automatic feeder, on the floor below. A Leffel 32-inch turbine wheel is the motor, which runs the mill and other machinery, water being brought to the wheel, through a well-built, iron-hooped, 36-inch wooden tube, 235 feet long, from the dam,² the last 70 feet of the tube being reduced to

¹ See Plate XXI.

² See Plate XIX.

30 inches in diameter. In building the millhouse, provision was made for the future installation of concentrating machinery. This house was built about five years ago; and the entire plant is in first-class condition. A miner's hut, intended for a tool-house, can be seen in Plate XIX.

The location of the dam across Yahoola creek is a narrow gorge between two hills, just below an extensive bottom, which, by flooding, would, it is estimated, furnish, on the erection of a dam, from 20 to 30 feet higher than the present dam, several hundred horsepower. The necessary rights to land, subject to overflow, from increasing the height of the dam, have been secured by the company.

Lot 1,030 was granted by the State to William Sims of DeKalb county. It was sold, by the sheriff, in August, 1833, to Jesse F. Cleveland, to satisfy a judgment of the Court, in the suit of John Choice against William Sims. It was again sold by the sheriff, in July, 1835, to John Choice & Co., at the suit of the officers of the Court against William Sims. On Nov. 15th, 1839, a warranty deed, to an undivided third of the lot, was given by Cyrus Choice to Tully Choice. In May, 1840, William J. Davis, U. S. Marshal, sold the entire lot to Horatio Miller and Charles V. Chamberlin, as the property of John Choice, to satisfy judgments in the U. S. Court against Choice, Harben & Co., John Choice, a member of the firm of Choice, Harben & Co., and John Choice & Co., in favor of Weed & Fannin, Wm. M. Telesten and Henry B. Leeson. From this time, the lot was known as the Miller, Ripley & Co. lot, after the mercantile firm in Augusta, Ga., of which Mr. Miller was senior partner. The next transfer of this lot was in October, 1890, over 50 years, after the last, mentioned. It was then deeded to Frank W. Hall, who two weeks later, deeded it, except the farm-

ing interest in eight or ten acres of bottom lands, to William G. McNelley; and he, on the same day, Oct. 23rd, 1890, deeded it to William W. Murray, except the farming interest, above mentioned. In April, 1891, William Starr Miller, residuary legatee of Horatio Miller, deceased, gave a deed to Frank W. Hall, for an undivided half of lot 1,032. In May, 1891, Mr. Hall sold, to John Huff, about 10 acres of farming interest in the lot, the mineral interest being reserved to W. W. Murray. In October of the same year, Judge Murray, by contract and agreement, gave to N. H. Hand, President of The Hand and Barlow United Gold Mines and Hydraulic Works of Georgia, right-of-way through the northeast side of lot 1,030. This was in consideration of a mill-site, for the Mary Henry mill, on lot 1,053, belonging to the Hand and Barlow company. In January, 1892, Judge Murray sold to The Gold Mountain Mill and Mining Co., all of lots 1,001 and 1,030, with the mill-site interest in 1,053, except the eight or ten acres of farming interest, reserved, as before mentioned. In May, 1894, this eight or ten acres of farming interest was sold, by John Huff, to R. H. Baker, who is still its owner.

THE FREE JIM MINE

This mine lies in the northern half of *lot 998, 12th district*, in the town of Dahlonega, just east of that part, which has been built up. The principal work done on it has been the sinking of several inclines, to a depth of from 50 to 70 feet, and an open cut, of considerable size; also, a small amount of placer work in the auriferous gravels.

The history of this mine is somewhat unique. Some time between 1830 and 1839, a free negro, by the name of James Boisclair, came from Augusta to Dahlonega, and opened a little cake and fruit shop in the town. He discovered, on lot 998, a vein of gold ore, in the early period of gold mining in the county, and desired to buy the lot. Not being allowed, by law, to buy or sell real estate, Dr. Joseph J. Singleton, for some time chief officer of the branch mint at Dahlonega, was made his guardian. The court records are not clear, as to when Boisclair came into possession of the lot; but it is well known, that he did own it, for many years, and that he worked it, with great success, for quite a long time. The proceeds of this mine enabled him, to establish the largest dry-goods and general merchandise store in Dahlonega; and, for a while, he did a flourishing business. In addition to his general merchandise store, he established a bar-room; and this led to trouble; for, on the records of the Baptist church of Dahlonega, of which he was a member, appears an account of his trial, for selling spirituous liquors on the Sabbath, resulting in his expulsion from the church. In course of time, however, he repented; and about a year after his expulsion, he was again received into the church.

In 1849, when there was much excitement among the Georgia miners, over the gold discoveries in California, he contracted with 40 or 50 miners, to go with him, to seek their fortunes in the California gold-fields, he, to pay their way to California, and they to give him, as compensation, half of their first year's earnings. He had been there, only a short time, when he became involved in a dispute with a miner, over a claim, and was shot and killed.

During the time he was mining so successfully in Dahlonega, he was sued by a merchant in Augusta, for a debt he had left unsettled, and one half of the lot was sold, to satisfy the claim, Mr.

Harrison W. Riley being the purchaser.¹ From him, it has come down to Mr. William A. Charters, of Dahlonega, through The Augusta and Dahlonega Mining Co. and Judge W. W. Murray.

In 1866, about sixteen years after the death of Boisclair, the other undivided half of the lot was sold, by the sheriff of Lumpkin county, to Mr. N. K. Butler, of Augusta, to satisfy a judgment of the Court, in favor of N. K. Butler & Co., against the estate of James Boisclair. Mr. N. K. Butler, Jr., administrator of the estate of N. K. Butler, deceased, sold this undivided half to Messrs. Hiram D. Gurley and E. E. Crisson of Dahlonega, in February, 1896. Recently, Mr. Charters has sold an undivided sixth of the lot to Messrs. Gurley and Crisson, so that each of these gentlemen now owns an undivided third of the lot.

The vein, worked by James Boisclair, is believed to be the same vein, that has been worked, in recent years, through an incline-shaft. It is said, that Boisclair sunk three inclines on the vein, west of the Hand ditch, which now runs through the lot; but, that, on neither,

¹ The Court records show, that this half of the lot was held, in the name of Alexander Duncan, and, by him, was sold to Harrison W. Riley. I am informed by Col. W. P. Price, Ex-member of Congress, and a prominent citizen of Dahlonega, to whom I am indebted for this sketch, that Duncan was a white man, who lived with Boisclair's sister, as his wife; and that, as a free negro could not own property in his own name, except through a guardian, it is practically assured, that, while the property was in Duncan's name, yet Boisclair was the real owner. While the Court records seem to be incomplete; yet the title to this lot is good, in the present owners; for half of it was held by The Augusta and Dahlonega Mining Co., from May 4th, 1862, to Jan. 31st, 1891, and the other half was held by Mr. N. K. Butler, of Augusta, from Oct. 2nd, 1866, to the day of his death, many years after, and was sold by the administrator of his estate, Feb. 11th, 1896, a tenant living on the property, constantly, during this time. Seven years ownership, with occupation of the property, makes title to real estate good, in Georgia.



OLD ROASTING FURNACE AT THE BASTYNE FINDLEY RIDGE, DAHLONEGA, GEORGIA.

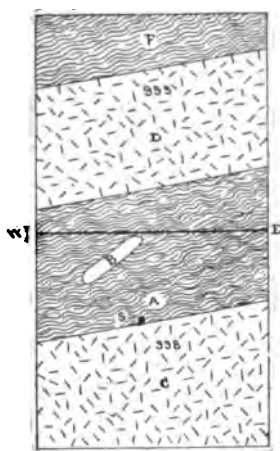


did he go down lower than 20 feet. Others are said to have resumed the work, where he left off, sinking the shafts deeper, and to have had good results therefrom. Their names, I was not able to learn. The old inclines, however, have long since been filled. East of the Hand ditch, probably 200 yards, G. W. Jenkins and J. Roberts sunk an incline, on what is supposed to be Boisclair's vein, on top of a knoll, about the year 1881.¹ They worked this shaft down below water-level, a distance of about seventy feet along the incline, where the iron-stained, cellular quartz began to be replaced by pyritiferous quartz. The vein, at the bottom of this shaft, I am reliably informed, is five feet thick. The ore is said to have averaged \$4.00 per ton. This vein lies within ten feet of the north margin of the large dike, before described, and has the same trend. At the time of my visit to the property, no work had been done on the veins, for some time; and the shaft was not in such condition, that I could get a sample for assay; but ore, lying on the dump, consisted of saccharoidal quartz, quite cellular and friable, and considerably stained by iron sesqui-oxide. Much of it shows bright, unaltered pyrite. About two hundred yards west of this shaft, and parallel with the vein, is an open cut, only a short distance from the south margin of the smaller dike described. This is known as *The Barker Cut*. It was worked, about 1855, by Mr. Joseph J. Singleton, Jr., son of Dr. Singleton, and Judge J. R. Lawhorn. It was probably started by them. Their results, it is said, were very satisfactory. Beginning about 1867, The Yahoola River and Cane Creek Hydraulic Hose Mining Co. worked, with a hydraulic giant, the mouth of this cut and other neighboring deposits, as gravel-placer, their work continuing, for about three years. No further work was done in the cut, until about 1893, when Mr. Martin Barker, supposing he was working on lot 999, adjoining, on which he held a lease from The

¹ See fig. 31.

Hand and Barlow United Gold Mines and Hydraulic Works of Georgia, did considerable work, sluicing the mica-schist saprolite, in which there were a number of small rich veins. Mr. Barker worked for about eight months, and was doing well, when Judge Murray, owner of an undivided half of lot 998, had a survey made, by a competent engineer, who ascertained, that the cut was entirely on lot 998. Judge Murray at once stopped the mining, in the cut. Some placer-work was being done on the gravel bed, by Mr. E. E. Crisson, about the same time; but no work has been done on the property, since. Fig. 31 will indicate more clearly the situation of the various openings and belts of schists.

FIG. 31



Geological Sketch of Lots 998 and 999. A. Mica-schist Belt, in Which the Free Jim Mine is Located. B. The Barker Cut. C. North Border of the Large Hornblende-schist Dike. D. The smaller Dike of Hornblende-schist. F. Mica-schist. S. Shaft of the Free Jim Mine.

A small stream passes through the lot; and along this and in other lower portions of the lot are deposits of unworked auriferous gravel, covering about five acres. About one acre additional has been worked over, once. In this work, about 1871, Mr. James McDonald found a gold nugget, which weighed something over 32 dwts. This was sold to a merchant in Dahlonega, who sent it, with other gold, to the mint. While working the placer, in 1893, with a hydraulic giant and a sluice-box, Mr. E. E. Crisson saved 200 dwts. in gold nuggets, weighing from six grains to 14 dwts. 6 grs., besides a quantity of finer gold. The largest nugget, he sold to Mr. W. C. Albers, of The Chestatee Mining Co., for a pocket-piece. All these nuggets, Mr. Crisson sold for \$1.00 a pennyweight. The convenient location of the Hand ditch to this placer,

at an elevation of 75 or 80 feet above it, will greatly facilitate working it, at the least expense. As much may be said, for the abundant soft mica-schist saprolite on this lot, which is said to contain a great many very small auriferous veins, all through it.

THE LAWRENCE MINE

This mine is located on *lot 951, 12th district*, quite close to the center of the town of Dahlonega, and in what was formerly known as *The Pigeon Roost Belt*, now *The Barlow Belt*. Soon after the close of the civil war, Mr. William G. Lawrence discovered a gold vein on this lot; and soon thereafter, Mr. Wm. M. Varnum hunted up the grantee of the lot, and purchased it from him. For a while, it was leased to Mr. Lawrence, the discoverer of the vein; but Mr. Varnum associated with him, as owners of the lot, Col. R. H. Moore and Messrs. James L. Harris, David T. Harris and James R. Lawhorn. They worked the lot, jointly, in 1869 and 1870, with much success. I was informed by highly reputable citizens of Dahlonega, that there was no question about these gentlemen having made a great deal of money, while working the mine. They worked two vertical shafts, on the same vein, by levels, hoisting the ore, and hauling it to the mill, a 4-stamp wooden mill, located on a branch along the road, not far from Wimpy's grist-mill. The character of the ore changed, towards the bottom of the shafts, from a free-milling to a highly sulphide quartz; and the operators became discouraged, and stopped work. Their greatest difficulty, however, seems to have been the large quantity of water constantly coming into the shafts. From this time, the mine was idle for several

years. Mr. Varnum had died; and Mr. Weir Boyd had bought the sixth interest, which had been retained by Varnum.

About 1876, Mr. N. H. Hand bought the entire lot, and put up a ten-stamp iron mill on it, using water from the Hand ditch. He put in a steam-pump, by which the shafts were kept free from water. He sunk the shafts deeper, and continued work, for a year and a half; but the ore had become so refractory, that only a very small percentage of the gold was saved on the plates; and so, work was suspended. In the work done by Mr. Hand, the Messrs. Price Bros., bankers, of Cleveland, Ohio, were associated with him; and, during a part of the time, one of them was in charge of the work. The shafts, at the time of my visit, were filled with water; and I was not able to examine the vein. On reliable authority, however, I am able to say, that the shafts are 100 feet deep, and that the vein is about ten feet thick.

The mill, first erected by Mr. Hand, was removed to the Findley mine; and, later, a second 10-stamp mill was erected, having a 26-foot over-shot wheel, and using water, taken from the Hand ditch, the water, after use, being returned to the ditch. This mill has been used as a custom mill, of late years, having the patronage of those persons, mining in a small way, and without means to erect a mill of their own. The mine is provided with pumping, hoisting and other necessary machinery. In addition to the mill, is a warehouse and an assay laboratory, all on the Lawrence lot.

This property is now owned by The Hand & Barlow United Gold Mines and Hydraulic Works of Georgia, and is in the charge of Capt. H. D. Ingersoll, of Dahlonega, General Manager of the mines.

THE CRESCENT GOLD MINE

This property consists of *lots 953, 954 and 955, 12th district*, and is owned by THE CRESCENT GOLD MINING CO., of Grand Rapids, Mich., of which Mr. J. C. Batdorf is President. This company also owns *lot 1,102*, in the same district, about a mile and a half south-east of the lot, on which the mine is located.

The property gets its name from the existence of a synclinal fold in the schists, including the vein, which suggests a crescent to the fanciful. Most of the mining work has been done on lot 955, about a quarter of a mile above Wimpy's grist-mill, on the hillside, along the northeast bank of Yahoola creek, which flows through this lot, in a southeasterly direction. Four tunnels have been driven into the face of the hill, quite close to each other, two of them, side by side, being called the Double Tunnels. The trend of the vein, going up stream, is east and west, for a short distance, when it bends to the north, away from the bank of the creek. The dip is not more than 10° to the north, varying to the east. This vein is from four to eighteen inches thick, averaging, it is said, about eight inches. The property has been, for some time, idle, and not in condition for proper examination, or for securing ore samples. The several tunnels were driven through the soft schistose saprolite, the larger quartz vein and numbers of small veins, with that part of the schist, immediately surrounding them, being milled. In addition to the tunnels, there are a number of old inclines, from which the ore was mined, down to the sulphides. The ore is said to be worth, from \$5.00 to \$40.00 per ton.¹

¹ Since 1896, Mr. R. W. Walker has leased this mine; and he is now engaged in some prospecting work. He informs me, that some of the ore, he has taken out, is quite rich, consisting of a cellular, iron-stained quartz, and assaying as high as \$100.00 a ton.

THE RIDER MINE

About 1846, Mr. Samuel Rider discovered on *lot 1,058, 12th district*, a vein of gold ore. He sunk an incline shaft on it, and carted the ore to a wooden 5-stamp mill, which he had put up, on what is now the site of the present Lockhart mill, making, it is said, several thousand dollars, as profit. After this, a considerable amount of "gouging" was done on the lot. The first work done, by The Yahoola River and Cane Creek Hydraulic Hose Mining Co., after completing their ditch, in 1860, was some hydraulic mining, on this lot. The old works are now fallen in, and are in bad shape. No ore samples could be taken.

THE HORNER MINE

About ten years ago, an auriferous vein was discovered on *lot 855, 12th district*, by Mr. Joseph Clements; whereupon he and Dr. N. F. Howard, a physician in Dahlonga, who, with Mr. W. J. Worley, owned the lot, erected a 5-stamp mill on it, and worked the vein, for about a year. At the end of this time, the mill was levied on, and sold, to satisfy a claim against its former owner. Dr. Howard informs me, that the ore was worth from \$3.00 to \$5.00 per ton. He says, that the vein was worked to water-level, the ore changing from free-milling to sulphide quartz, which, with increasing expenses, they were not able to make pay a profit on the labor; and that, for this reason, he sold the mine to THE DAHLON-

EGA GOLD MINING AND MILLING Co., incorporated under the laws of the State of Illinois. The property was sold, Oct. 3rd, 1889, to Mr. H. R. Horner, as Agent, whose name the mine bears; and I am informed, that a Mr. Hammer of Chicago, Ill., constituted the company. Mr. Horner was placed in charge of the work. Under his management, a 10-stamp mill was erected, and work was prosecuted, for two years, at the end of which, it is said, that, on account of extravagance in management, Mr. Hammer directed, that operations be suspended. Since then, the property has been idle. At the time of my survey, it was not in such shape, that samples for assay could be taken. It is still the property of The Dahlonga Gold Mining and Milling Co., of Chicago.

THE FISH TRAP MINE¹

The Fish Trap property consists of *lots 932, 933, 934, 944, 945 and 946, 12th district*, arranged in a rectangle, with its longer diameter, north and south. The first and last named lots lie side by side, and constitute the south side of Crown Mountain. It is on these two, that the auriferous saprolites and veins have been worked, the principal part of this work consisting of three large open cuts, with many short tunnels and shafts.

The Fish Trap mine was first known, as a gravel placer, the more southern lots, lying below the mountain, and extending nearly to the Chestatee river, being considerably worked, about 1840. The auriferous gravel, lying along the Fish Trap and other small

¹ Field-work by S. W. McCallie, Assistant Geologist.

branches, which, rising on Crown Mountain, flow down to the river, are said to have been remarkably rich in gold.

The first rich gold-bearing vein was discovered on the property, about the year 1840; and it is still known as *Bind's Vein*, taking its name from its discoverer. Shortly after this, another rich vein, called *The Freeman Vein* was discovered and worked. On Bind's vein, was a shoot, which was reputed to be very rich. This shoot, known as *Bind's Shoot*, was worked to a depth of fifty or sixty feet, the ore being hoisted to the surface by hand, and carried to a branch, where it was beaten, in an iron mortar, and the gold, separated by panning. As much as 100 dwts. of gold are said to have been, at times, recovered from a panful of this beaten ore. In 1883, the old shaft was re-opened and timbered, by The Fish Trap Gold Mining Co., with a view to working the vein; but I am not informed, as to their results. During the civil war, no mining was done on this property. In fact, it was idle, until 1879, when Messrs. W. H. and Jesse Satterfield, brothers, prospected the property, taking out about sixty tons of ore, which was hauled to the Griscom mill, yielding, it is said, an average of \$10.00 per ton. In 1882, Mr. Daniel Stambaugh purchased the four lots, 932, 944, 945 and 946, which then composed the property. He erected a 10-stamp mill, tenement houses, a water-ditch etc. on the property, and operated the mine, for a short time, selling it, in January, 1883, to Messrs. C. E. Lovell and L. F. Willetts of Hornellsville, New York. These gentlemen organized a stock company, THE FISH TRAP GOLD MINING Co., with Mr. Willetts, as President, and Mr. Lovell as Secretary and Treasurer; and, having added ten stamps to the mill, and put the property in excellent shape for mining operations, they worked it, for a few months, and then leased it to Mr. R. B. King. He likewise worked it, for a short time, and then it was re-leased to



MILL-DAM OF THE MARY HENRY GOLD-MILL, DAHLONEGA, GEORGIA.



Messrs. Blackmer & Huff, who continued mining operations, until it was sold, through Mr. Frank W. Hall, to Mr. Marshall A. Phillips, October 30th, 1889, and he, two days later, transferred it to THE DAHLONEGA CO., LIMITED. Since that transaction, no regular work has been done on the property. The subsequent transfers are the same as those for the Bast and other mines, already given.

Lot 932 was granted by the State to Mrs. Sophia Marsh, a widow, of Jefferson county, who sold it in April, 1833, to Campbell Raiford. He immediately transferred it to Jacob Page, who, in July following, gave to Seaborn Jones a quit-claim deed to $\frac{7}{8}$ of the lot. Prior to this, in May, 1833, a mortgage on the lot had been given, by Uriah I. Bullock, to Eli S. Shorter, Seaborn Jones, Edward Cary, Arthur B. Davis and James S. Calhoun, to this and other lots. To $\frac{2}{9}$ of $\frac{1}{8}$ of this lot, Thomas J. Rusk gave a warranty deed to Jason C. Wilson, in June, 1833. In September, 1842, this and other lots were sold, by the sheriff, as the property of James S. Calhoun, to Henry L. Benning and Edward Cary, at the suit of William Clark against James S. Calhoun. In January, 1843, the sheriff sold $\frac{1}{9}$ of $\frac{1}{8}$ of this lot, as the property of Thomas Rusk, to Reuben Herndon, to satisfy a Court judgment in favor of A. G. Walton against Thomas J. Rusk and others. In March following, Edward Cary gave to Henry L. Benning a quit-claim deed to "one half of the interest of James S. Calhoun" in 932 and other lots. No transfers of record were given, from this time to May 1st, 1882, when Mary H. Benning, administratrix of Seaborn Jones, deceased, deeded all of lot 932 to Daniel Stambaugh. Subsequent transfers have been given above.

The other lot, on which vein mining has been done, lot 946, was granted by the State to Hamilton T. Boyd, of Butts county, who sold it in April, 1833, to Enoch Byrn. In July, 1842, Byrn sold it

to Harrison W. Riley, who, the records show, bought it again, at sheriff's sale, Feb. 25th, 1846, as a result of a suit of Isaiah Green, Agent for Jesse L. Riley, Guardian for James Boisclair, against Enoch Byrn. It was held by Harrison W. Riley, till May, 1862, when he sold this and other lots to William S. Roberts, President of The Augusta and Dahlonega Mining Co., who sold it to Daniel Stambaugh, May 4th, 1882. From this point, the transfers are the same as those for lot 932, given above.

At the time of Mr. McCallie's examination of the property, the mine was in no condition for examination, all the cuts, tunnels and shafts being filled, more or less, with the soft schistose saprolite, which had fallen in. The largest excavation covers, probably, a quarter of an acre, and has a depth of, from ten to fifty feet. Besides this, there are two other cuts, from ten to thirty feet deep, and from thirty to forty feet wide, and about a hundred yards long. The veins vary, from an inch to twenty feet in thickness; and, in their dip, from 20° to vertical, cutting the country-rock, at various angles. There are quite a number of small parallel veins, which, frequently, have rich shoots in them, some of which have produced more than a thousand pennyweights of gold. These rich shoots have been worked down to water-level, and then abandoned. The property has been badly "gouged". It has a good reputation among the local miners, who consider it to be one of the best producers in the Dahlonega district.

The country-rock consists of mica- and hornblende-schist, the occurrence of which, along Findley Ridge, has already been described at length, in another part of this report.

The Mill is a 20-stamp mill, with stamps weighing 450 pounds each, the source of power being a steam-engine. The mill is in need of repairs; but it could be put in good order, for a few hundred

dollars. It is located on Fish Trap branch, about half-a-mile from the cuts. There is, also, a pump-house and a boiler, located on the hillside near the cuts, formerly used for pumping water, from the Hand ditch to the reservoir, on the hill above the open cuts.

Lots 933 and 934 were not a part of this property, until it was sold by Mr. Hall to Mr. Phillips.

Since March 7th, 1893, Mr. Frank W. Hall, of Dahlonga, Ga., has been the owner of the property.

THE IVEY MINE¹

This property consists of lots 819, 820, 821, 860 and 861, 12th district.² The principal part of the mining work has been done on lots 820, 860 and 861. Through 820 and 861, runs Stover's branch, which empties into Cane creek, not far away. The discovery of a rich, gold-bearing gravel-bed, along this branch, about 1840, was the beginning of the fame of this well-known mining property. Speaking of this deposit, one of my predecessors, Dr. George Little,³ says: — "Soon after the discovery of gold, 500 men were working in this branch, at one time; and the yield, for one day, along the whole course of the stream, is known to have been 6,000 dwts."

It is said, on good authority, that, during the first working of this auriferous gravel-bed, from 50 to 100 dwts. per man was not

¹ Field-work by S. W. McCallie, Assistant Geologist.

² Since the date of this report, the Shockley lot, No. 891, has been purchased, and made a part of the Ivey property.

³ State Geologist of Georgia, 1874-79.

an uncommon yield, in a day. On either side of the branch is a low ridge; and, from side to side, of these ridges, the gravel has been worked once or twice; but, along the branch, it is said to have been worked over, not less than a dozen times; and it is still being worked. This bed covers about twenty acres; and, after having been worked, more or less, for fifty years, men working, in a crude way, make day-wages.

After the first workings of the auriferous beds, no work of any consequence was done on the property, until 1879, when Mr. R. T. Ivey, owner of lot 860, for whom the mine is named, prospected the veins on that lot, making, it is reported, from 50 to 75 dwts. of gold, per man, in a day's work, by beating the ore, in an iron hand-mortar, and panning the crushed material. On the strength of Mr. Ivey's work, lot 860 was bought by Mr. Emanuel Bast, in December, 1879, and lots 820 and 861, in May, 1881. Shortly thereafter, he deeded the entire property to *The Consolidated Gold Mining Co. of Georgia*, of which he was manager. In September, 1878, Mr. Bast had bought the lot, on which was located the mine, that has, since, borne his name; and, in July of the following year, he had sold it to *The Pennsylvania National Gold Mining Co. of Georgia*, which was succeeded in 1880, by *The Consolidated Gold Mining Co. of Georgia*. This company, having come into possession of both the Ivey and the Bast mines, work was prosecuted simultaneously on both, for several years, lots 820 and 861 having been bought, in the meantime. On the Ivey, a ten-stamp mill was erected, in the southwest corner of lot 860, the mill-house being made large enough, to accommodate ten additional stamps, if necessary. It was only about ten months, before these were added, making it a 20-stamp mill. It was operated for two and a half years, using, as ore, the auriferous mica-schist saprolite, with its included quartz veins, which was dug out of the Ivey cut, and flooded to the mill, through a flume.

The 20-stamp mill was removed, about the first part of 1884, to a point, about midway between the center of lot 820 and its southwest corner; and forty more stamps were added, making it a 60-stamp mill, which was then, and is now, the largest stamp-mill in Georgia.

Having some trouble, in getting water from the Hand ditch, the company decided to build a ditch; and what is known, as *The Cane Creek Ditch* resulted. They bought right-of-way, water-rights etc., and built the ditch, in 1883, bringing it 18 miles, from the headwaters of Cane creek, the work being done, under the immediate supervision of Mr. J. P. Imboden, Superintendent. After increasing the number of stamps from 20 to 60, the company made use of a portion of the ditch-water, for power, with which to run the mill, the motor being a high-pressure Leffel turbine wheel, under a 180-foot head. The remainder of the water was used for hydraulic mining.

Shortly after the large mill was put in operation, Mr. S. Nelson White, Secretary and Treasurer, died, and about the same time, the health of the President, Mr. E. W. Andrews, became seriously impaired, and he was sent to a hospital for the insane, where he subsequently died. The stock of the company changed hands, and a new management assumed charge. From this time, no work of any consequence seems to have been done; though, about three or four years ago, some work was done in the Rock-house shaft, on lot 820. This shaft was first worked by a man by the name of Hampton, years before the civil war, when the lot belonged to Dr. Joseph J. Singleton. It is generally understood that Dr. Singleton made thousands of dollars, working this vein.

In 1886, the property was sold, by the sheriff, to The Frank W. Hall Merchandise Co., to satisfy a claim of that company against The Consolidated Gold Mining Co. of Georgia. It was next sold to Mr. Marshall A. Phillips, and was by him transferred to The Dahlonga

Co., Limited, who went to large expense, to have the ditch rebuilt, and put in first-class condition; but they did not work the mine. March 7th, 1893, as a result of the litigation, forced on this company, by its Managing Director, as related elsewhere in this report, this property was sold by the sheriff, and was purchased by Mr. Frank W. Hall, of Dahlonga, who still owns it. Since it has been owned by Mr. Hall, he has bought the property, known as Clay Creek falls, about two miles distant, with the view to transmitting the power electrically to the Ivey property, for operating the mill and other machinery, leaving all the ditch-water for hydraulic mining.

During the time, in which the Ivey and Bast mines were operated, by The Consolidated Gold Mining Co. of Georgia, it is said to be a matter of record, that the stockholders were paid twenty-three monthly dividends, of \$4,000 each. From an original letter, from Mr. Andrew Mason, Superintendent, U. S. Assay Office, New York City, addressed to Mr. Robert P. Waring, Assayer-in-Charge, U. S. Assay Office, Charlotte, N. C., under date of Aug. 17th, 1886, I have copied the following statement of gross weights after melting, of deposits of Georgia gold bullion, made by S. Nelson White, Treasurer, and E. W. Andrews, President of The Consolidated Gold Mining Co. of Georgia, together with the gross value of gold and silver contained: —

	Gross ozs.	Gold	Silver
"In 1882-----	1,788.63-----	\$32,598.28-----	\$165.46
" 1883-----	3,065.98-----	53,688.61-----	208.07
" 1884-----	842.93-----	12,919.18-----	103.59
" 1885-----	101.04-----	1,490.51-----	27.30
Total for 4 years--	<u>5,798.58</u>	<u>\$100,696.58</u>	<u>\$504.42</u>

From the original of a letter, from Mr. H. C. Hickok, Acting Superintendent, Mint of the United States at Philadelphia, Penn., to Mr. Robert P. Waring, Assayer-in-charge, U. S. Assay Office, Charlotte, N. C., under date of Aug. 16th, 1886, I copy the following: —

" . . . , that upon careful examination of our books, for the past four years, we do not find, in our list of depositors, either of the names you mention, to wit: — 'The Consolidated Georgia Mine', 'Bast and Ivey', or 'The Frank W. Hall Merchandise Co.' We know nothing, here, of that mine, or either of the other parties named. I should add, in explanation, that all deposits, that come to us, by express, are entered on our books, in the name of the Express Agent, who presents the bullion."

The following, I copy from the original: —

"United States Assay Office,
Charlotte, N. C.,
21st Aug., 1886.

Memorandum of deposits from the Consolidated Georgia Mine,
Dahlonega, Ga.,

1881-----	\$2,111.08
1882-----	5,954.89
1885-----	1,537.02
	<hr/>
Total-----	\$9,602.99
	<hr/>

The above comprise the entire deposits from the above mentioned mine, at this office.

(Signed) Robt. P. Waring,
Assayer in Ch."

In a letter to Mr. Frank W. Hall, Dahlonega, Ga., dated Aug. 21st, 1886, and accompanying the above memorandum, Mr. Waring says: — "It is highly probable, that the statistics for New York are under the mark, as they do not note locality so rigorously, as is the practice here."

The Ivey cut is located obliquely across the lot-line between lots 860 and 861, being about equally divided between the two lots. It is about 200 yards long, by 150 feet wide, by from 10 to 60 feet deep. It was from this cut, that most of the material, passed through the mill, was taken. The gold-bearing belt, in the cut, is about 80 feet wide; it has been worked down to the unaltered schists, where the ore changed from a free-milling to a sulphide quartz. The entire belt is more or less auriferous; but the principal source of the gold is the small auriferous quartz stringers, included in the schists, and usually parallel with them. These small veins are frequently very rich, yielding, it is said, from 100 to 500 dwts. of gold to the panful of beaten quartz.

The strike of the country-rock and veins is northeast, while the dip is, at a high angle, to the southeast.

The Rock-house shaft is located on a vein, on the side of the ridge, south of Stover's branch, on lot 820, near the line between it and 861, at a point about 200 yards, east of the mill. It is about 40 feet deep. At the bottom of this ridge, the rock is a typical gray, gneissoid schist, containing considerable quartz. Alteration in these schists is only incipient. A number of surface cuts, at the bottom of the ridge, were worked in a small way, probably by trespassers, for what could be made from them.

At the head of the Ivey cut, is a low-grade auriferous belt of schists, containing small quartz stringers, which runs along the top of the ridge, on the north side of Stover's branch, to Cane creek,



CANE CREEK FALLS, NEAR DAHLONEGA, GEORGIA, SHOWING THE PART OF A DIKE OF HORNBLLENDE-SCHIST, OVER WHICH
THE WATER FALLS.



on the Gordon lot, 791. It has an average width of about 40 feet. The schists are decomposed at the top, for some distance down, the red and yellow schistose saprolite being interlaminated with bands of gneiss. The strike and dip of these schists are much the same, as those of the schists in the Ivey cut.

Five samples were taken by Mr. McCallie, from this property, which, on assay, yielded the following results: —

No. 1	.....	0.05 oz.	(\$1.03)	of gold	per ton
" 2	.....	0.25 "	(\$5.17)	" " "	" "
" 3	.....	0.06 "	(\$1.24)	" " "	" "
" 4	.....	0.01 "	(\$0.21)	" " "	" "
" 5	.....	0.08 "	(\$1.65)	" " "	" "

No. 1 was taken from the Rock-house vein; No. 2, from the Ivey cut, near its center; No. 3, from the Ivey cut, about half way between the Rock-house vein and the center of the cut; No. 4, from one side to the other, across thirty-five feet of the low-grade belt on top of the north ridge; and No. 5, from the rich parts of this belt. It should be borne in mind, that the property has been idle, for a long while, and that it was hardly possible, to take fair, average samples, in the present condition of the veins.

The Ivey Mill, as before stated, is a 60-stamp mill, the stamps weighing 450 pounds each, this size having, for a long time, been considered best adapted to milling the saprolite ores. The mill was used only about six months, when work was stopped. It is in very good condition; and, for a small outlay, it could be put in good running order.

Cane Creek Ditch, which conveys water, for mining purposes from the headwaters of Cane creek to the Ivey mine, was constructed, in 1883. It is 18 miles long. As originally constructed, it was supplied with dams, trestles, flumes etc., and had a capacity of 300

miner's-inches of water. In the winter of 1889-'90, it was enlarged and rebuilt in part, by Mr. Frank W. Hall, under a contract of The Frank W. Hall Merchandise Co. with The Dahlonga Co., Limited, the latter being, at that time, the owners of the property. Since then, the half of it, next to the mine, has been allowed to go down, though the earth- and rock-work are still in good condition. The remaining half has been kept up, by the owner of a grist-mill, for the use of it.

Lot 860 was granted by the State to Willy Miller, at the lottery in 1832. In November, 1872, it was deeded by L. B. Miller, executor of Willy Miller, deceased, to R. T. Ivey, who on December 15th, 1879, deeded it to Emanuel Bast. It was next transferred to The Consolidated Gold Mining Co. of Georgia, by Emanuel Bast, in June, 1883. On June 12th, 1886, this lot was sold, with the entire property of The Consolidated Gold Mining Co. of Georgia, to The Frank W. Hall Merchandise Co., to satisfy a judgment of the Court, in favor of that company. A few days later, The Frank W. Hall Merchandise Co. transferred this and other lots to Frank W. Hall, who, in October, 1889, sold it, with other property, to Marshall A. Phillips. On November 1st, 1889, it was transferred, with other lots, by Mr. Phillips, to The Dahlonga Co., Limited. In March, 1893, this and other lots, belonging to The Dahlonga Co., Limited, was sold by Capt. John W. Weaver, Receiver, to Mr. Frank W. Hall, of Dahlonga, Ga., who is still the owner of the property.

Lot 861 was granted by the State to Mastain Usrey, of Jones county, who gave a warranty deed to it, in March, 1833, to Wallace H. Park. By Park, it was sold to Joseph J. Singleton, December 15th, 1836. It was next deeded, by Messrs. Wimpy and Quillian, Administrators of Joseph J. Singleton, deceased, to A. M. Wallace and David T. Singleton, in January, 1859. In March, 1860, Messrs.

Wallace and Singleton deeded it, with other lots, to Arthur M. Eastman. In July, 1863, an undivided half of this lot and 820 was sold to William S. Roberts, with a warranty deed, by Benjamin Hamilton, to whom a quit-claim deed was given, July 19th, 1866, by Arthur M. Eastman, to all of 861 and other lots. In November, 1872, a sheriff's deed was given to John A. Parker and Beverly A. Martin to a half of lot 861 and other lots, on a judgment of the Court. On March 16th, 1861, Messrs. Parker and Martin gave a warranty deed, to their undivided half of this lot and 820, to Joseph King Merritt, Trustee; and, on the same day, William S. Roberts deeded the other undivided half of this and 820 to Mr. Merritt, Trustee. On May 31st, following, the latter, as Trustee, sold both lots entire to Emanuel Bast. In June, 1881, these lots were sold by Mr. Bast to The Consolidated Gold Mining Co. of Georgia. In March, 1882, Gen. James Longstreet, U. S. Marshal, sold an undivided half of 861 and 820, at the suit of John VanNest against Benjamin Hamilton. Mr. VanNest, August 30th, following, gave to Mr. Bast a quit-claim deed to this undivided half; and, on the same day, Mr. Bast gave to The Consolidated Gold Mining Co. of Georgia a quit-claim deed, to all his interest in lots 861 and 820. From this point, the ownership of these lots is the same, as that of 860.

THE GORDON MINE¹

This mine, known, also, as the New Gordon mine, to distinguish it from the old Gordon property, now a part of the Barlow property, lies just west of the Ivey mine, on the opposite side of Cane creek,

¹ Field-work by S. W. McCallie, Assistant Geologist.

on lot 791, 12th district, the entire property consisting of lots 609, 679, 680, 720, 721, 750, 751, 791 and 792. The first work, done on the property, was about 1842, by Mr. Frank Capps, an English miner, who erected a wooden 10-stamp mill on Cane creek, near what is now known as the Boston cut. He began mining a vein just across the creek; and he operated the mine, for about two years, with success. This mill was subsequently replaced, by a more modern 10-stamp mill, which, with the mine, was operated, for about four years, by Mr. Hezekiah Kelly, under a lease from Mr. George William Gordon, its owner, the ore being taken from *The Boston Cut*. Mr. Gordon sold the property to his nephew, Mr. George A. Gordon, who operated the mine and mill, until the beginning of the civil war.

From this time, no work was done on the property, until about 1892, when Mr. W. B. Fry, working under the direction of Messrs. T. K. Clark and David Hunter, operated the mine and mill, for about three years. During this time, the cut was made across the hill, in the bend of the creek, north of the Boston cut, and the hillside was washed, as a surface deposit. These works are said to have paid well, especially the surface work.

The Boston cut is about 100 yards long, 75 feet wide, and from ten to forty feet deep. The ore, the veins and the country-rock are similar to those, in the Ivey cut, and need not be described.

The work on the hill, north of the Boston cut, consists, principally, of surface work, covering about a quarter of an acre, and a cut on a three-foot vein, which extends entirely across the ridge at the top, and is about forty feet deep. The ore from this vein is said to have been, in places, very rich.

The mine, at the time of Mr. McCallie's visit, was in no condition for examination, and no samples for assay were taken. There is at present, no mill on the property. The ditch, which brings

water from Crooked creek, is two miles long, and furnishes a 125-foot head of water for hydraulic mining, and sufficient water, under less pressure, to run a 10-stamp mill. The last mill on the property is said to have had an over-shot wheel, 33 feet in diameter, as its motor. The property is owned by Mr. Geo. A. Gordon, of Somerville, Mass., whose representative in Dahlonega is Col. W. P. Price, of the law firm of Price and Charters. Mr. Gordon is, at present, Secretary of the New England Historical Society, with headquarters in Boston.

THE BARLOW MINE¹

This property consists of *lots 741, 743 to 748, inclusive, 789, 793, 794, 795, 797 and 798, besides the Gordon lots, 602, 605, 606, 652 to 656, inclusive, 658, 659, 671 to 676, inclusive, and 681, all in the 12th district.*

The Ralston mine, described beyond, and the lots belonging to the Ralston, have now been incorporated, as a part of the Barlow property. Even when worked as a separate mine, it was owned by the parties owning the Barlow property. Lot 747 is considered the principal of the Barlow lots. On it, stands the Barlow mill; and much of the mining done has been, on this lot. The Barlow cut is the largest in the county, enormous quantities of micaceous saprolite, with the included auriferous quartz, having been excavated and milled. The greater part of the works lies on the right bank

¹ Field-work by S. W. McCallie, Assistant Geologist.

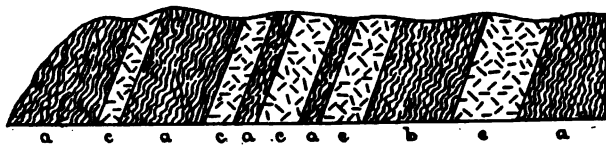
of Cane creek, in quite a broken section of the county, the hills rising from 100 to 300 feet above the surface of the streams.

No very definite information was secured, as to the early history of the mining operations, or as to the first discovery of gold on the property. The placer work, in the gravel beds, which, from the extent of the débris left, must have been very extensive, probably yielded many thousand pennyweights of gold, before the discovery and working of the veins. The first regular vein-mining done was by THE GEORGIA CO., of which Col. George G. Pride was President. This company erected, in 1866, a 40-stamp steam mill, and a number of arrastres, at the location of the present stamp-mill, on lot 747. The building still remains, as the mill-house of the present mill. The Pride mill was operated, for about two years, the ore coming from the Barlow and Ralston cuts. Great extravagance and bad management are said to have attended the operations of The Georgia Co.; and, in February, 1871, the property was sold by the sheriff to Mr. S. L. M. Barlow, to satisfy claims against The Georgia Co., in favor of S. L. M. Barlow, M. H. VanDyke, John W. Weaver and others. Mr. Barlow then made a contract with Mr. N. H. Hand, by which a branch ditch was constructed from the large Hand ditch, near Dahlonga, to the Barlow mines, crossing Cane creek by 2,300 feet of pipe, in a manner similar to the crossing of the Yahoola, by the main ditch, the banks and hill-slopes being of about the same character. The ditch, which, then, was known as *The Pigeon Roost Ditch*, but which is now known as *The Barlow Ditch*, furnished sufficient water, to operate a 40-stamp mill. But this mill, the arrastres etc., were soon replaced, with a more modern 20-stamp mill, of the F. W. Hall patent, having 450 stamps. On lot 748, the Huff and Roberts 5-stamp mill stood on the west bank of the creek, and was in operation in 1878.

In 1882, in order to work the ore, on the other side of Cane creek, more advantageously, a 10-stamp mill was erected on that side of the creek, only a few hundred yards from their other mill. This mill was operated, for only about two years, when it was torn down and removed.

Mining was carried on, continuously, for more than twenty years, the property changing hands, twice, within this period. During this time, most of the work of excavating the saprolite from the now extensive cuts, was done, by hydraulic mining. For the last five or six years, mining on the property has been very irregular, and at no time, on an extensive scale. The mine is not, at present, in

Fig. 32



Section along the Preston Cut, Barlow Mine. a. Mica-schist Belts. b. Auriferous Mica-schist Belt, 6 Feet Wide. c. Belts of Hornblende-schist.

such condition, as to advantageously show its value. Much *débris* has fallen into the cuts, from their long disuse, and some work would be required to put the property in good working order. However, this could be done, at a comparatively small outlay. All the ditches, dams etc., are in fair condition; but the mill would require some slight repairs.

With the exception of the gravel placers, all the work, done on the property, consists of open-cut work on the ore-bodies, which are composed of decayed mica-schists, enclosing thin quartz stringers. Seven large cuts have been excavated, by the hydraulic method, the largest of which, the Barlow cut, is about half-a-mile

long, by from 100 to 300 feet wide, by about 80 feet deep, in places. Another prominent cut is *The Preston Cut*, along the Preston vein. A noted vein is *The Dog-head Vein*, which, while small, is very rich. Capt. H. D. Ingersoll, the Manager of this property, reports that eight tons of ore from this vein, yielded 548 dwts. of gold on the mill. A section along this cut is given in fig. 32. The following is a list of the auriferous belts and veins:—

The Preston Belt.....	50 feet thick
The Barlow "	30 to 200 " "
The Ogle "	50 " "
The Dog-head Vein.....	2 " "
The Husinger "	10 inches "

The country-rocks are quartzose schists and hornblende- and mica-schists. The hornblende-schists occur, as large irregular masses, imbedded in the quartzose or the micaceous schists, when viewed transversely; but, longitudinally, they are in bands, intercalated in the other schists. These masses are similar to those, crossing the tunnels of the Crown Mountain property, heretofore described, and which, as then stated, appear to be apophyses from the large dike lying adjacent. This dike continues from Dahlonga on down to the southwestern part of the county, passing through the northern part of the Barlow property.

The dip of the rocks is usually to the southeast, at an angle, between 30° and 70°, while they strike, generally, about N. 20° E. A variation from this was noted, in the north end of the Barlow cut, where the strike is nearly due north, and the dip, directly to the east.

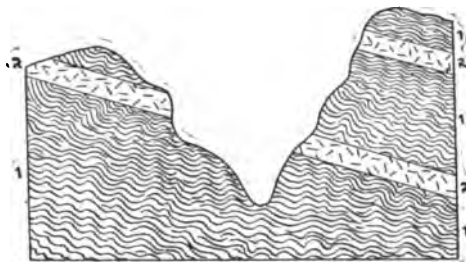
Samples for assay were taken by Mr. McCallie, which gave the following results:—

No. 1	0.025 oz. (\$0.52) of gold per ton
" 2	0.160 " (\$3.31) " " " "
" 3	0.320 " (\$6.61) " " " "

No. 1 was from the Preston cut ; No. 2, from the Husinger vein; and No. 3, from the Barlow cut.

THE PIGEON ROOST MINE, which was on lot 746, and, for a long time, a separate property from the Barlow, was operated, for a few years, until it was advertised for sale, in December, 1884. It is now included in the Barlow property. The Ogle cut is a part of the old Pigeon Roost mine. Its 10-stamp mill stood about an eighth of a mile southwest of the Barlow mill. Success, for some reason, does not seem to have attended the work, on this property.

Fig. 33



Section across the Barlow Cut near Its Center. 1. Mica-schist. 2. Hornblende-schist.

The Barlow Mill, which stands on the site of the old Pride Mill, on Cane creek, near the mouth of "Pigeon Roost" branch, is a 40-stamp mill of the F. W. Hall patent, with 450-pound stamps. Only two batteries, however, are now in running order, the entire mill being only in tolerably fair condition, though it could be put in good order, at a small expense. The mill is run by water, taken from Cane creek. A well-built dam on lot 793, with a conduit to the mill, supplies, under an 18-foot head, the water, which actuates a 40-inch Rodney Hunt turbine wheel. This wheel develops about 75 H. P. A number of miner's cottages, a shop, stables etc. are located near the mill ; but all are in need of repair.

The changes in ownership, of lot 747, will, in a general way, indicate the changes of the entire Barlow property, since it has been much known, as mining property. This lot was granted by the State to Martin Strother, of Newton county, who sold it, in February, 1833, to Farish Carter. Two days later, Carter gave a quit-claim deed, to an undivided half of it, to William Ward, who parted with half of his interest, on May 2nd, following, giving Uriah J. Bullock a quit-claim deed to it. Bullock gave, to Jason C. Wilson, Thos. J. Rusk and Leander Smith, a quit-claim deed, to his interest in the lot. The other fourth, Ward sold to Jacob Page, May 22nd, 1833, giving him a warranty deed. On July 3rd, following, Thomas J. Rusk sold an undivided twelfth of the lot to Jacob Page, the conveyance, by warranty deed. This placed the ownership of a third of the lot in Page. In January, 1834, Leander Smith sold an undivided twelfth of the lot to R. G. Dunlap, who, a year later, transferred it, by warranty deed, to Robert Patton. The records next show, that Robert S. Patton, September 18th, 1835, gave to John C. Calhoun a warranty deed to an undivided third of this lot; and, on the 10th of the following month, a warranty deed to an undivided twelfth of it, to Henry M. Clay and Farrish Carter. This Calhoun was the illustrious United States Senator. In May, 1844, Zachariah Samuel deeded to Willis J. Milner a third of lot 747; and, in November, 1846, Edward J. C. Milner deeded an undivided third of the lot to William G. Lawrence and Robert H. Moore — presumably the same third. Messrs. Moore and Lawrence sold their interest, in May, 1860, to The Yahoola River and Cane Creek Hydraulic Hose Mining Co., giving a warranty deed. In March, 1866, Mr. Lawrence gave to George G. Pride a quit-claim deed to an undivided third interest in lot 747. Three days later, A. J. Hansell gave to Col. Pride a warranty deed to an undivided sixth of the lot;

and on the 7th of the next month, Samuel M. Carter gave him a warranty deed to an undivided sixth of it. On June 30th, 1866, Geo. G. Pride, U. S. Grant and S. L. M. Barlow deeded to The Georgia Co. two-thirds of this and other lots. On the same day, George G. Pride, President of The Georgia Co., deeded to The Yahoola River and Cane Creek Hydraulic Hose Mining Co. all that portion of lots 747 and 794, which lies north of a line, drawn twenty feet north of the north bank of Cane creek, which passes through these lots, all the remaining portion of the lots being deeded, by the latter company, to The Georgia Co., upon an amicable partition, made that day. Gen. U. S. Grant, one of the stockholders above mentioned, was, subsequently, President of the United States.

In February, 1871, the property of The Georgia Co. was sold by the sheriff to S. L. M. Barlow, to satisfy a judgment of the Court, in favor of Clayton & Adair, Joseph Winship & Co., John Tiner, John W. Weaver, M. H. VanDyke, William H. Veal and S. L. M. Barlow. On August 5th, 1873, the property of The Yahoola River and Cane Creek Hydraulic Hose Mining Co. was sold to N. H. Hand, at the suit of Frank W. Hall against that company. In April, 1874, Mr. Hand sold to The Hand Gold Mining Co. all that part of lots 747 and 794, belonging to him. On June 3rd, 1879, William J. Worley, Rufus H. Baker, James R. Lawhorn and A. G. Wimpy, commissioners, sold to Patrick Calhoun, of Atlanta, for partition, one third of lot 747, at the suit of Margaret M. Calhoun, Sr., and others against John C. Calhoun and others, tenants in common, this third interest being sold, as the property of John C. Calhoun, deceased. On the same day, a quit-claim deed to this was given by Patrick Calhoun to N. H. Hand, who, about three weeks later, deeded to Samuel L. M. Barlow all of lot 747, except that part, which had been deeded to The Yahoola River and Cane

Creek Hydraulic Hose Mining Co., by The Georgia Co. In May, 1881, Mr. Hand deeded all his interest in this and other lots to The Hand Gold Mining Co. April 16th, 1890, Peter Townsend Barlow and Stephen H. Olin, executors of S. L. M. Barlow, deceased, gave a warranty deed to part of lot 747, and other lots, to Nathan H. Hand, who, July 1st, following, deeded this to The Hand & Barlow United Gold Mines and Hydraulic Works of Georgia. The remaining part of lot 747 and other lots were bought, by this company, at sheriff's sale, January 5th, 1892, at the suit of N. H. Hand, N. H. Hand & Co., W. P. Price, Stephen H. Olin and P. T. Barlow, executors of S. L. M. Barlow, deceased, against The Hand Gold Mining Co.

The Hand & Barlow United Gold Mines & Hydraulic Works of Georgia, of which Mr. Christian Wahl is President, and whose principal office is No. 100 Prospect Avenue, Milwaukee, Wisc., still owns this property.

THE RALSTON MINE ¹

This property consists of *lots 726, 728 and 731, 12th district*, no two of which adjoin each other. These lots adjoin the Barlow property, and are embraced, as a part of that property, though the mine was formerly worked, as a separate and distinct mine, but by the same company. The main cut, which connects with the Barlow cut, is several hundred feet long, and from forty to sixty feet deep. The ore-bodies, the country-rock, the dip of the veins and schists, etc., are practically the same, as those on the Barlow property, and need not be again described.

¹ Field-work by S. W. McCallie, Assistant Geologist.

This property was worked, first, as a placer, along Ralston's branch, between 1840 and 1845, by Mr. Elisha Castlebury, grandfather of State Senator J. F. Castlebury, now representing the 32nd district. I was informed, by Senator Castlebury, that his grandfather found this placer very rich, and took a great deal of gold from it. Mr. Castlebury also worked some of the veins on the property, using a 4-stamp wooden mill, which he erected. It is said, that these veins were very rich. He operated the mine, for some years. After that, it lay idle, for a long time; and, after the close of the civil war, it was sold by Mr. R. J. Castlebury, father of Senator Castlebury, to Col. Geo. G. Pride, in 1866, for \$15,000, Mr. Castlebury having bought the two lots, at the sale of his father's estate, for \$400. Col. Pride then organized THE GEORGIA Co., consisting of northern capitalists. The Ralston was worked by Col. Pride, in connection with, what was afterwards the Barlow, and other properties. In 1870, Mr. John Huff and a Mr. Roberts leased the property, for a term of four years, and erected, on it, a 20-stamp mill, operated by steam. At the expiration of that time, Messrs. Huff & Roberts returned the property, including the mill, to its owner. Considerable success is said to have attended the work of these gentlemen. It was sold to Mr. S. L. M. Barlow, in 1871. Mr. Barlow operated the mill, for about two years, when steam-power was replaced by water-power, the water coming from the Barlow branch of the Hand ditch. After this, it was operated by Mr. Barlow, and by The Hand and Barlow United Gold Mines and Hydraulic Works of Georgia; in all, about ten years, since which time it has been idle, with the exception of some custom work, on the mill. In 1878, a 10-stamp mill, said to have been one of the most effective mills in the county, was erected on lot 726 of the Ralston property, for a company, known as THE CINCINNATI Co. What this concern accomplished, I did not learn.

The Mill, now on the property, a 20-stamp mill, of the Hall patent, with stamps weighing 450 pounds each, is located on lot 728. It is in need of some repairs, the cost of which would probably not exceed \$150. It uses 64 miner's-inches of the ditch-water, under a pressure of 125 feet. The motor is a 3-foot Knight impact wheel, the water supply of which is brought through an 8-inch pipe, developing 40 H. P., which can be increased, by increasing the size of the supply-pipe.

An assay of material, taken by Mr. McCallie, from a point near the Barlow cut, resulted, as follows: —

No. 1 0.125 oz. (\$2.58) of gold per ton

The property is still owned by The Hand and Barlow United Gold Mines and Hydraulic Works of Georgia, as a part of The Barlow Mining Property.

THE HEDWIG MINE¹

The mining property, known by the above name, consists of lots 527-530, *inclusive*, 591-594, *inclusive*, 599-601, *inclusive*, 660-663, *inclusive*, 669 and 670, all in the 12th district.

Two noted old mines, THE CHICAGO & GEORGIA and THE WHIM HILL, are included in the large mining property, to which the name, THE HEDWIG MINE, was given, a few years ago, by Mr. Christian Wahl, of Milwaukee, Wisc., its owner, in honor of his daughter, Mrs. Weld, whose given name the property bears.

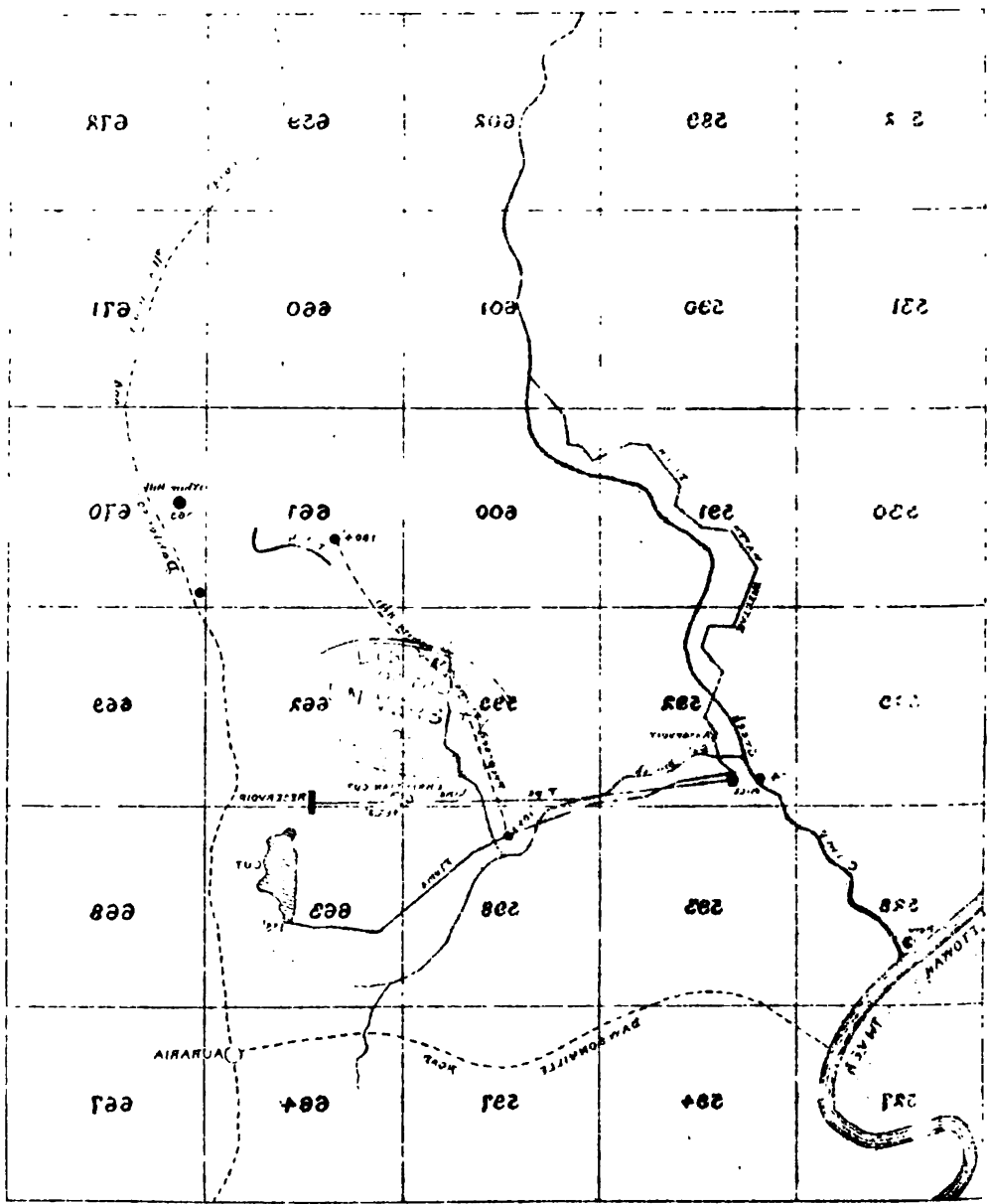
The Chicago and Georgia mine is located about a quarter of a

¹ Field-work, in part, by S. W. McCallie, Assistant Geologist.

mile north and northwest of Auraria, not far from the Etowah river. One of the principal cuts, *The Hedwig*, is located on lot 663, only a short distance west of the public road, between Dahlonega and Auraria. West of this, on the other side of the hill, is *The Chicago and Georgia Cut*, much larger and deeper, than the Hedwig. Placer work on the gravel beds was done on several of the lots of the Hedwig property, as early as 1840, and every small stream is said to have been quite rich. But the first vein-mining, of any consequence, was done by Capt. J. L. Davis, who erected a 10-stamp mill, at the mouth of what is now the Chicago and Georgia cut. This mill, he operated, for only a short time, however, when the property was purchased by *The Chicago and Georgia Co.*, who moved the mill over to another small branch, near by, and added to it 10 stamps, making it a 20-stamp mill. This company leased 50 miner's-inches of water from the owners of the Hand ditch, using it for hydraulic mining, while the mill was run by steam. The Chicago and Georgia Co. operated the mine and mill, for some time, with apparent success. The property was subsequently sold to Mr. Christian Wahl, its present owner. Since Mr. Wahl has owned the property, considerable work has been done, in the Chicago and Georgia cut; and another, the Hedwig cut, mentioned above, has been commenced, and considerably worked. This cut, which was begun last April,¹ has been excavated by hydraulic mining. It is now about 500 feet long, and 40 feet wide, varying, in depth, from 10 to 40 feet, as it ascends the hill, into which it is cut. Fig. 34 is a transverse section across the cut, showing the positions of the ore-belts and the adjacent schists. There are two of these ore-belts in the Hedwig cut, one six feet thick, and the other, ten feet thick. There are, also, two in the Chicago and Georgia cut, one of which is 30 feet thick, and the other, 50 feet thick.² The mine is in good condition.

¹ April, 1896.

² See fig. 35.

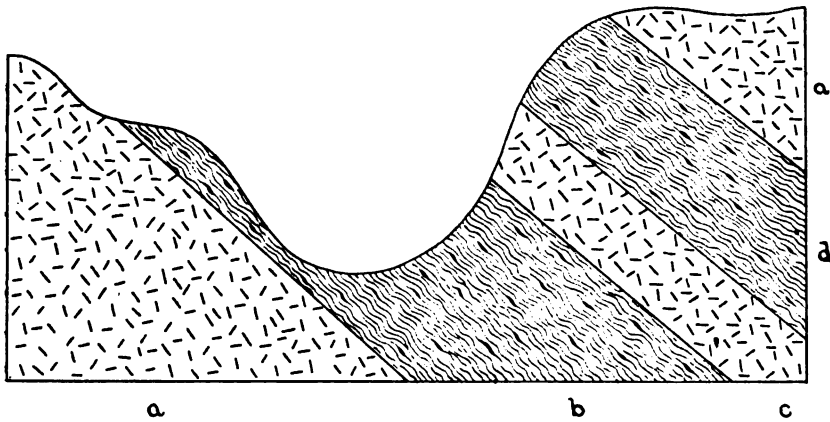


Map of the Helwig Mining Property Showing Various Points of Elevation with Reference to the Benchmark at the River on Lot 28.

in good condition. The reservoir gives a 50-foot pressure, for hydraulicking in the cuts.

The Hedwig Mill is located on lot 592, near the center of its south side, on Camp creek, half-a-mile from the point, where it empties into the Etowah river. It was erected in 1894; and it is in

Fig. 35



Transverse Section through the Chicago and Georgia Cut. a and c. Belts of Hornblende-schist. b and d. Auriferous Stringer Leads.

excellent condition. It has 40 stamps, weighing 450 pounds each; and it is operated by a 4-foot Ridgeway water-wheel, the water being received through two $\frac{3}{4}$ -inch nozzles, and under a 228-foot pressure. It is brought from the reservoir to the mill, through 2,868 feet of 18-inch riveted spiral iron pipe.¹ The ore is brought through a flume, from the cut to the mill, a distance of a little over half-a-mile, and is stored in three bins, from which it is flooded into the mill, from time to time. This mill has a crushing capacity of about 75 tons per day.

Between pages 472 and 473 is a map of the Hedwig Mining

¹ See map of the Hedwig Mining Property.

Property, which shows the locations of the Whim Hill mine, the old Chicago and Georgia cut; the mill, reservoir, pipe-line and flume; the village of Auraria; and various points of elevation, with reference to a bench-mark at the river, on lot 528.

THE WHIM HILL MINE is another one of those, on which small shoots of quartz, marvelously rich in free gold, have been found and worked. It is located on lot 670, on the same side of the public road, as the Chicago and Georgia mine, but nearer to Dahlonga. I do not know, who discovered the rich shoot, which was worked early in the gold-mining period of Georgia; but I am informed by State Senator J. F. Castlebury, that his grandfather, Mr. Elisha Castlebury, owned and worked the Whim Hill mine, about 1845; and that he was told, that his grandfather had a glass-jar, about the size of an ordinary candy-jar, and a tumbler, both full of gold, which he had obtained, by working this mine; and that he used to get gold out of the mine, in such shape, that it was necessary, for him to bend it backwards and forwards, in order to separate it. From this, it is understood, of course, that the quartz was heavily impregnated with metallic gold, in coarse wire and plates. There is no reason, to doubt the accuracy of this statement; for there are on exhibition in the State Museum, specimens from other mines in the State, that are fully equal to this description. Besides, it is well known, and disputed by none, that other mines in the county, among them the Findley, the Ivey, the Calhoun, the Battle Branch and the Boly Field, have all produced considerable material of this character, from time to time.

An incline shaft, known as the Bell shaft, was sunk, on top of the hill, a short distance down, many years before the war. Later on, Major Hockenhull sunk the shaft 100 feet or more. At the bottom of the hill, a tunnel was driven, years ago, to pass under the

shaft, and strike the rich shoot below; by whom, I did not learn. This tunnel, which is 500 feet long, fell short of the shaft, about 200 feet, the work being stopped by the hard, unaltered mica-schist. The quartz from this shoot, rich in free gold, was beaten in a hand-mortar; and the gold was separated from the disintegrated quartz, by panning. None of it was milled. When the incline was worked, a whim, operated by a horse, was used, for drawing up ore and water from the shaft. From this circumstance, and the location of the shaft, was derived the name of the mine.

The Whim Hill lot was purchased, for \$20,000, about thirty years ago, by Messrs. Wahl Brothers, wealthy manufacturers, of Chicago, one of whom is now the owner of the large number of lots, consolidated, by him, under the name of THE HEDWIG MINE.

THE BATTLE BRANCH MINE¹

This mine is located on the west side of the Etowah river, one mile west of Auraria, *on lots 457 and 524, 12th district*. The principal work has been done along a small branch, known as The Battle Branch. This property was among those, that were mined, between 1840 and 1850, though placer work was begun on it, in 1831. The branch received its name from the fact, that, in May, 1831, a number of North Carolina, South Carolina, Tennessee and Georgia miners were engaged, in mining the deposits on these lots, when a dispute arose, between the Georgia and Tennessee miners, as to the possession of the property. A bloody battle followed, in which a large number of men were seriously hurt.

¹ Field-work by S. W. McCallie, Assistant Geologist.

the mine has been known as the Battle branch, and at the same time as the Battle Branch mine.

The mine around Badolaga was deserted by the miners during the excitement, following the discovery of the mine. In 1849, an Englishman, known as Major Hockenull, began to work the mine with a dozen men. He worked for two months, but his men were discouraged, and he means was rapidly decreasing; his men had been drawn on, to an extent, and his men too, had begun to desert. With these circumstances, Major Hockenull, after consulting his men around him, decided to leave it with them, and to continue the search for the gold, and after a conference with the men, Major Hockenull thought it worth while to continue the search. Major Hockenull was promising to pay them, as soon as he had the gold, and he resumed work in the mine within five minutes after he had resumed work. Gold was struck, with nuggets in the mine, from a pea to an acorn. By night, the mine had been taken from this pocket. Afterwards, which yielded 9,000 dwts. of gold, he had 1,000. Other pockets were taken, and it is reported, that Major Hockenull had taken 80,000 worth of gold.¹ His work consisted in working the rich shoots of ore, which were found in the branch.

Major Hockenull of Cumming, Ga., son of Major

After the war, about 1878, this mine was worked by Messrs. Thomas R. Lombard, Frank Imboden and J. P. Imboden, the last being the Superintendent of the mine. It was then known as THE DAHLONEGA MINE. Other rich pockets of gold were discovered by them; and I am informed that they secured \$3,000, as a result of their work. In 1875, Mr. W. G. McNelley, Capt. John W. Weaver and one or two others worked the property, and they came across a pocket, which afforded beautiful specimens of gold with galena in quartz, the gold being largely included in the galena. Two handsome specimens of this rich ore are on exhibition, in the Georgia State Museum in Atlanta. Since the work, done by Messrs. McNelley, Weaver and others, the property has remained idle. At present, it shows a large cut, made by Messrs. Lombard & Imboden, who began mining about 1878, hydraulicking the saprolite belts, with water from the Mill Creek ditch. The ore from the cut was sluiced to a 10-stamp mill, which was located on the river, at the mouth of Battle branch. A lawsuit, between the owners of the Betz mine and these gentlemen, as to the ownership of the Mill Creek ditch, was begun, and bitterly waged, even muskets and shot-guns being resorted to, by the employees of the parties-at-law. This brought the work on the Dahlonega mine to an end, about 1882. Besides the open cut, there is a long tunnel, parallel with the cut, in

Hockenhull, received, since this matter was set up in type, makes no mention of the employment of a force of men by his father, etc.; but he says, that in driving, in an old tunnel, they struck a pocket of eight bushels of ore, which yielded 2,250 dwts. of gold. He continues: — "Some time after finding the first pocket, while working in another old tunnel, and in three feet of where the work in the tunnel had been abandoned, another pocket, of ten bushels of ore, was found, that yielded 10,000 dwts. of gold. I do not remember the weight of gold, taken from other pockets, or the number of other pockets, but have heard, that they (Messrs. Hockenhull and Pasco) took 80,000 dwts. from the mine."

which, it is said, rich shoots of ore have been found. These shoots dip with the schists, which themselves are also auriferous. The country-rock is mica-schist, containing numerous garnets. It strikes northeast, and has a dip of 35° to the southeast. A pile of ore, near the mouth of the tunnel, consists of white quartz containing some pyrite, galena and garnets; it is frequently cellular, especially when taken from near the schist walls. This mine has always been regarded as a very rich "pocket mine."

An excellent water-power can be secured, where the old mill stood, on the river, with fully a twenty-foot head; this may be had by the erection of a dam.

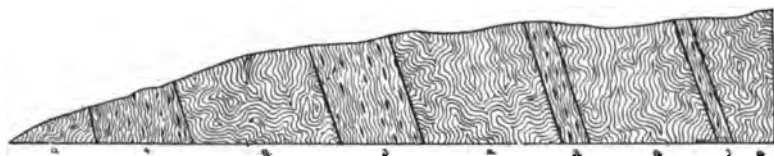
THE BETZ MINE¹

This mine, formerly known, as THE WING MINE, is located on *lots 388, 12th district. Lots 384, 453, 454 and the mineral interest in 452* are also a part of the property. The Etowah river flows diagonally across the last named lot, in a southeast direction. The cut, where the mining operations have been carried on, is in the head of a small hollow, along which flows a branch, on its way to the river. Before the civil war, Mr. Hawkins Kelly worked this mine, to a limited extent. After doing considerable work of preparation, he had a mining ditch constructed, seventeen miles long; and, having gotten everything in good working shape, he began to work the property, when the breaking out of the war caused his work to cease. After the war, he sold the property to Col. Wing, and gentlemen associated with him, who were organized as The Etowah

¹ Field work by S. W. McCauley, Assistant Geologist.

and Battle Branch Hydraulic Hose Gold Mining Co. Subsequently, Mr. John F. Betz, of Philadelphia, came into full possession of the mine and the ditch. Some time in the early part of 1895, Mr. Betz began work on the property, with Mr. Otto C. Scupin as Superintendent and Manager. A Huntington mill was erected, the Mill Creek ditch was cleaned out, cottages were built, and everything about the place was fixed up in good order. The mine was in excellent condition, for examination of the ore-bodies, at the time of Mr. McCallie's visit. The mining work consists of an open cut, about 100 yards long, thirty to forty feet wide, and from five to twenty feet deep. Besides this, there are other smaller cross-cuts,

Fig. 36



A Section through the Schists and Auriferous Stringer Leads (So-called Veins) at the Betz Mine. a. Mica-schists. 1, 2, 3 and 4. Auriferous Belts or "Veins."

exposing the ore-bodies at different points. The latter consist of mica-schist, with inclusions of small quartz stringers. In places, especially in the main cut, the schists contain much quartz, in the form of small grains, forming ore-bodies, similar to those at the Barlow mine. In the extreme end of the open cut, is a dark-colored mica-schist, which is auriferous. The country-rock is mica-schist, passing, in places, into quartzose schist. Its strike is northeast and southwest, and its dip, about 30° to the southeast.

Fig. 36 represents a section through the rocks, showing the gold-bearing belts of this mine. Vein No. 1 is four feet thick; vein No. 2, eight feet thick; vein No. 3, twenty-eight feet thick; and

vein No. 4, thirty-four feet thick. Assay samples were taken by Mr. McCallie, which resulted, as follows:—

Vein No. 1	.....	0.105 oz.	(\$2.17)	of gold per ton
" " 2	.....	0.150 "	(\$3.10)	" " " "
" " 3	.....	0.070 "	(\$1.45)	" " " "
" " 4	.....	0.080 "	(\$1.65)	" " " "

The Betz Mill is a five-foot Huntington roller-mill, which is run by water from the Mill Creek ditch, under a 110-foot pressure. There are two large bins and an ore-crusher to the mill, with the necessary gold amalgamating plates etc. A large reservoir, on top of a neighboring hill, has a capacity of 1,000,000 gallons of water. This is connected with the mine and with the mill by iron pipes, of which there are 200 feet of 10-inch pipe, 200 feet of 8-inch pipe, and 1,300 feet of 6-inch pipe. The mill and mine are kept in excellent condition, under the superintendence of Mr. Scupin. I have not seen, in the county, a mining property, that is in better shape. Mr. John F. Betz, of Philadelphia, Penn., is the owner of this property.¹

¹ Since press-work was begun on this report, Mr. Scupin has been very active in his mining operations. He has sunk a shaft, which is now 250 feet deep, on an incline of 45°; and I am informed by a disinterested party, that very encouraging shipments of gold are being made, regularly, by Mr. Scupin, from Gainesville. It is currently reported, that Mr. Betz has recently refused a handsome offer for the property.

In a letter, recently received from Mr. Scupin, I am informed that, for every 50 feet of depth in the incline shaft, levels are run out, in both directions, along the vein, taking the ore from both the incline and the levels. Also, that he is now driving another incline, thirty feet north of the main shaft, for ventilation, the new shaft being already 170 feet deep, and in an ore-body. He states, that the ore-body, cut in a perpendicular, is 18 feet thick, and that he has not yet reached the foot-wall; also, that 150 feet west of the main incline, another has been driven 110 feet deep, on another large ore-body, which shows "good pay-stuff with marked increase in value as depth is reached." He says, further, that, at 150 feet,

The Mining Ditch, belonging to this property, which was originally constructed by Mr. Hawkins Kelly, was cleaned out, after the war, by The Etowah and Battle Branch Hydraulic Hose Gold Mining Co., and its volume of water was increased, by the addition of a number of small streams to its supply. The ditch was, then, and is, now, known as *The Mill Creek Ditch*. In the dry season, the streams, which supply it, are quite low; and only about 150 miner's-inches of water is gathered from them, though more could be, if all the water was put on the ditch, and kept on it. The size of the ditch is variable. At the rock cuts, where there has been no enlargement by caving and cleaning, it is $3\frac{1}{2}$ feet wide at the top, $2\frac{1}{2}$ feet at the bottom, and $2\frac{1}{2}$ feet deep. In the earth cuttings, where there is no rock, it is from $3\frac{1}{2}$ to $5\frac{1}{2}$ feet at the top, from 3 to $3\frac{1}{2}$ at the bottom, and from 2 to $2\frac{1}{2}$ feet deep. In its present condition, its capacity is sufficient, to carry not more than 200 miner's-inches of water; but, by enlarging the flumes and narrow parts in the rock, and by a thorough cleaning, it could be made to carry 600 miner's-inches. Mr. B. M. Hall, C. & M. E., of Atlanta, to whose report, on this property, I am indebted, for the data, just given, estimates, that, to enlarge and extend this ditch, so as to furnish 600 miner's-inches of water, as far as the Gordon, Ralston and other mines in that vicinity, including the Hedwig mines, would cost not more than from \$20,000 to \$30,000.

sulphides appeared in the ores, and that repeated assays of the sulphides show a value of \$30.00, \$38.00 and \$40.00 per ton, according to depth. He adds: — "We are now working a force of 30 men, and work is going on, day and night. All pumping out the drift-water, hoisting ore, etc. is done by machinery, for which water is used as the driving-power. The mine has been paying handsomely, these three years of regular operation, although only having a mill capacity of 35 to 40 tons per 24 hours; and, so far, the best ore-bodies have been kept intact."

THE MCINTOSH LOT

This lot, No. 386, 12th district, adjoins the Betz mine lot, 387, on the south; and a part of it is in the trend of the auriferous belt of the Betz mine. No regular mining has been done on the property, because it has not, at present, the necessary water facilities. However, water could be brought to it, from the Mill Creek ditch. The surface mica-schist saprolite is said to pan gold, almost anywhere; and, recently, some prospecting work has been done, in the nature of a test-cut, about 25 by 50 feet in area, following the dip of the decomposed mica-schists, to a depth of about 20 feet. The strike of the schists is N. 30° E., and their dip is quite uniformly 30° to the southeast. No quartz veins, of any consequence, were seen in this cut; but all the saprolite is said to pan considerable gold. I took a sample of this auriferous saprolite, for assay, from several points on the sides and bottom of the cut, including an insignificant quartz vein. It yielded the following result:—

No. 1 0.03 oz. (\$0.62) of gold per ton

A small trench, run across the strike of the schists, just beyond this cut, exposes two or three small quartz veins. The strike and dip of the schists, cut by this trench, are the same as those in the open cut. Just west of the cut, across a small drain, a short trench was dug, some time ago, on a white massive quartz vein, which was 18 inches thick in places. I was told, that this vein yielded very little gold.

I was informed by Dr. I. W. Waddell, of Dahlonega, who was in charge of the property, that some mill-tests of the saprolite from the cut, made for him, on the Huntington mill at the Betz mine, were very satisfactory, 5 tons of the saprolite yielding, on the mill,

23 dwts. 11 grs. of gold. This lot occupies a good position in the auriferous belt; and it should be more thoroughly prospected.

Lot 386 and the adjacent lot, 387, with several others in Lumpkin county, are owned by Mr. H. M. McIntosh, of Albany, Georgia.

THE WELLS MINE¹

This mine is located, half-a-mile southwest of Auraria, on *lot 1,213, 12th district*. An auriferous vein, on it, was first worked by a man, by the name of Wells, who owned the lot. He did considerable work on the vein, milling the ore, on a small stamp-mill, which stood, by a branch, not far from the mine. Subsequently, the present 10-stamp mill was erected; but it was operated, for a short time, only. At the time of Mr. McCallie's visit, the mine was not in operation; and the works, having fallen in, he was unable to make an examination of the vein, or take samples for assay. But, previous to this, when, for a short time, the mine was being operated by Mr. E. W. Coleman, I made an examination of the shaft and vein, where he was at work. The shaft was an incline along the vein, which was intercalated in the schists, its dip being about 40° to the southeast. The depth of the shaft, along the incline, was about 40 feet. A few feet below the surface, levels were run along the vein, for a short distance, and the ore was taken out. The vein was probably twelve inches thick, on an average. The ore was a sulphide-quartz ore, containing considerable chalcopyrite, and showing, occasionally, small plates of free gold. The vein has

¹ Field-work, in part, by S. W. McCallie, Assistant Geologist.

been worked at other points, along its outcrop, for a distance, it is said, of 700 feet.

The Mill, which was operated by steam, is much in need of repairs. The building is in bad condition, and the boiler and stamps need repairing. This property is owned by Mr. Daniel Howell, of Auraria, Georgia.

THE JOSEPHINE MINE

The property, now known as THE JOSEPHINE MINE, consists of *lots 526, 595 and 1215, 12th district, and lots 17, 18, 48, 49 and 82, 13th district, north half*. It was formerly known, as the Auraria mine, and was worked by The Auraria Mining Co., with Mr. John W. Hutchinson, Superintendent. Probably, no mine in the county has been so productive, as a gravel placer, as the Josephine. One mile of the Etowah river, which has never been dredged, flows through it, along which the gravel-placer yield has been rich. The McCluskey branch, however, seems to have been more productive, as a rich placer. About a quarter of a mile of this branch flows through the property. A large amount of placer work was done along these two streams, in "the forties."

Some years ago, a man by the name of Westbrook found a nugget on the McCluskey branch, which is said to have weighed 300 dwts. Before the civil war, Mr. John Lilly, with a negro slave, I was informed, took 1,050 dwts. of gold from an area of auriferous gravel, eight by ten feet square. Mr. Howell, father of Mr. Daniel Howell, who lives in Auraria, found, just in the bend of the Etowah river, on this property, while working the placer, quite a number of

nuggets of considerable size, the largest weighing 127 dwts. Work was begun on the gravel of these lots, soon after 1840, and it was worked by Messrs. Howell, John Lilly, Westbrook, Hall and Guyton. Mr. J. E. Wood, of Auraria, formerly owned lot 595, 12th district, and lot 17, 13th district. Mrs. Hendricks was a former owner of lots 48, 49 and 82, 13th district. Messrs. Hussey & Howell, The Auraria Mining Co. and Messrs. John F. Bigbee & Co. have also owned this property, the last named company still owning it. When owned by The Auraria Mining Co., it was known as the Auraria Mine. Since it has been owned by Messrs. Bigbee & Co., several nuggets, weighing from 8 to 27 dwts., have been found on the property. It is said, that this mine has been the largest producer of nuggets in Lumpkin county.

Besides the gravel placers, the auriferous saprolite has been worked, to some extent. A large open cut was begun about 1878, on one of the hillsides, not far from the mill. Considerable work was done, in milling the decomposed schists, with their included quartz veins, from this cut. In addition, a tunnel, 185 feet long, was driven from the rear of the open cut, under the hill. A cross tunnel was run out from this, and several stopes were made along the vein. One of these stopes, 87 feet long, came out at the top of the hill. The rocks, shown in the open cut, are mica- and hornblende-schists, a considerable dike of the latter appearing near the top of the hill, on the south side of the cut. On the hill, near the dwelling-house, in which Mr. Bigbee resides, an incline was run down for fifty feet. This, as well as the tunnel mentioned above, had caved in; and neither was in condition for examination, or for the taking of specimens for assay. Nor was the cut in proper shape; for the soft decomposed schists had fallen into it, from long disuse. At the time of my visit, no work had been done on the property, for

some time, except on lot 49, where a very rich strike of gold was recently made, by two or three men, claimed to be trespassers, near the line of an adjacent lot. These men were boldly aggressive, and taking the matter into court, they have managed to have this part of the property tied up, for the present. The work, done by these men, consisted in running an incline on a six-inch vein, and stoping it, eight or ten feet, along the trend of the vein. Levels, on each side, were also run. On the same lot, on another vein, a 45-foot incline was sunk, some time ago, on an eight-inch vein, which is said to have milled \$12.00 per ton.

A 20-stamp mill, with stamps weighing 450 pounds each, was erected about 1880, by The Auraria Mining Co. The property has been practically idle, now, for quite a while; and the mill is somewhat out of repair.

The auriferous belts which have evidently fed the placers, trend across the hills, which rise high above the river banks. The river would afford a fine water-power, if advantage were taken of it; and, with a pump, of sufficient capacity, water could be elevated to a reservoir, on top of some one of the high hills, thus giving the means for hydraulicking the auriferous gravel and saprolite. Otherwise, a water-supply ditch would be needed, on the property. An extension of the Mill Creek ditch could, at a small expense, be made to bring water to it. Fine drainage can be secured. It is said, that the surface of the hills and hollows pan well.

Messrs. John F. Bigbee & Co., of Auraria, Georgia, as stated above, are the present owners of this mining property. The mine bears the christian name of Mrs. Bigbee.

THE NORRELL MINE

Across lots 736 and 805, 12th district, lies an auriferous mica-schist belt, containing 32 small veins, varying in thickness from that of an ordinary lead pencil to fourteen inches. This belt is about 150 feet wide, and is said to be gold-bearing, from one side to the other, the decomposed schists, as well as the quartz veins, being more or less auriferous.

This belt was worked on lot 736, many years ago, by its owner, a man, whose name was John Norrell; since this time, it has been known as THE NORRELL MINE. The principal topographic features of lot 736, consist of two oblong hills side by side with the longer axis, north and south. One of these occupies the east side, and the other, the central part of the lot. The remaining part is occupied by a third parallel hill, the most of which lies on lot 735, which adjoins this lot on the west. On the top of the east hill, the eastern foot of which rests on lot 805, is a reservoir of 500,000 gallons capacity. From this fact, the hill is known as *The Reservoir Hill*.

About 1885, Mr. Norrell ran an incline on some stringer veins on the west side of the reservoir hill, 70 feet deep, along the incline, which was sunk directly to the east. The strike of the veins was N. 60° E., with a dip of about 35° to the southeast. A considerable amount of gold is said to have been taken from this stope, resulting, I am informed, in the sale of the property, by Mr. Norrell, very soon thereafter, for several thousand dollars. In the early part of 1893, Mr. D. O. Stewart, who had purchased the lot, sold a half of it to Messrs. Paul & Gullatt, of Atlanta. The lot was worked by these three gentlemen, as a company, for a few months, when

Messrs. Paul & Gullatt sold their half interest to Mr. H. L. Woodward, of Atlanta. Messrs. Stewart & Woodward then mined this belt in the latter part of 1893, making an open cut in lot 736, which was originally about seventy feet long, and from thirty to sixty feet wide. The decomposed schists have since fallen in, to such an extent, that the cut is now hardly longer than forty feet. Messrs. Stewart & Woodward worked the property for about a year and a half. In addition to the belt, above described, there is another, which passes through the northern part of the hills.

On the northwest side of the central hill, near its top, Messrs. Stewart, Paul & Gullatt, sunk an incline shaft, forty feet, in direction due south, on a vein, whose trend was north and south. From this incline, a wagon-load of the ore was taken, by Mr. D. Morrison, of Atlanta, now the owner of lot 736, in order to test the quality of the ore, before purchasing. This was milled on the mill of the Hightower mine, by Mr. Otto C. Scupin, now manager of the Betz mine; and I am informed by Mr. Morrison, that this sample, which he took, from the top to the bottom of the incline, yielded \$9.45 per ton.

In the ravine, below the southeast part of the Reservoir hill, considerable mining work was done by Messrs. Stewart, Paul & Gullatt, and Messrs. Stewart & Woodward, with what results, I did not learn.

The quartz, from the veins in these belts, varies from a friable, saccharoidal, to a hard, vitreous quartz. Very fair specimens of free gold have been found on the lot, one or two of which, I have seen. I was informed by Mr. Morrison, that about 1870, Mr. B. Roper found, at the bottom of Reservoir Hill, on lot 805, a "pocket" of rich gold ore, which yielded \$14,000.

Lot 736 is owned by Mr. D. Morrison of Atlanta, who has options on lots 804, 805 and 1,210, the first and last diagonally adja-

cent, and the other lying in between these two, on the east of 736. Nos. 804 and 805 are owned by Mr. B. Roper, of Atlanta, and No. 1,210, by Mrs. Norrell, widow of the former owner of 736 and 1,210.

There is no reservoir water on 736; but 804 and 805 are supplied with it, from Town creek.

Lot 736 is three quarters of a mile southeast of Auraria, and about the same distance from the Chestatee river, which flows northeast of this lot. The auriferous schists of this property are in the trend of the Turkey Hill, Calhoun and Chestatee mines, which lie on the east side of the Chestatee river. Only a little further away, than the Chestatee, flows the Etowah river, west of this lot.

THE TURKEY HILL, MINE

All the lots in Lumpkin county, which have been described have been 40-acre lots, lying north and west of the Chestatee river, and belonging to the original Cherokee country, which, in 1832, was surveyed and subdivided by the State into lots, and these were distributed to certain classes of its citizens, by lottery.

The Turkey Hill property consists of *a 250-acre lot, No. 163, and the greater part of a fractional lot, 169, in the 11th district*, originally a part of Hall county. The fractional lot lies along the east bank of the Chestatee river. This part of the river, it is said, has never been dredged; and, from the rich returns, which have been had from the dredge-boat work, it would, in all probability, prove of great value for dredging. It is estimated, that there are about

thirty acres of auriferous gravel on the property, which have never been worked. About ten or twelve acres of the gravel beds have been worked over, once, and about one acre, twice. Where work has been done, on the gravel placers, near the mouth of the Van Dyke tunnel, there are piles of pebbles, remarkable for their sharp angles, which are very slightly rounded, showing, that the material was brought, only a short distance, and was well covered with sand etc., before the water had much time to act upon it.

THE TURKEY HILL MINE is located on one of the high ridges, in the southern part of Lumpkin county, south of a similar ridge, on which the Calhoun mine is located, the two properties adjoining. All the work on the Turkey Hill mine, has been done on the south side of this ridge; whereas, most of the work on the Calhoun mine has been on the north side of the adjacent ridge. The hill, on which the mine is located, gets its name from the abundance of wild turkeys, that were formerly to be found on the ridge, it being, still, very good hunting-ground for this species of game. The hill is made up of mica- and hornblende-schists. I did not observe any of the latter, high up on the hill; but there are two dikes, near the base of the hill, on the south side, near the mill, to which I have before referred, in another part of this report. Adjacent to these dikes, are two veins on the east side of lot 163. One of these, the more northerly, is a 3-foot quartz vein, with a trend, N. 55° E., and its dip, with the schists, at an angle of 60° to the southeast. A small prospect opening had been made on this vein, at a point, about 250 yards from the center of the north and south lot-lines on the east. The vein consists of saccharoidal quartz, more or less marked with parallel lines of limonite, resulting from the decomposition of some iron-bearing mineral, which, while apparently pyrite, I was not able to positively identify. The stain-lines are parallel with the trend

of the vein. Lying adjacent to this vein, on the north, is a dike, about fifty yards wide; while, on the south side, is another, about 150 yards wide, both referred to, above. On the south border of this dike, lies what is known as *The 12-Foot Vein*. The width of this vein, of which I saw a cross-section, was twelve feet, consisting of quartz stringers, intercalated with mica-schist, striking N. 35° E., and dipping 60° to the southeast, the schists of the country-rocks having the same strike and dip. This vein was worked, about fifty years ago, by a man by the name of Reuben Morse. He sunk a shaft, forty feet deep, on a rich shoot; and another shaft, about thirty feet southwest of the first, between fifty and sixty feet deep, on another rich shoot. The ore from these shafts was crushed by four arrastres; and I am informed by Mr. W. T. Bryson, that Morse told him, that this ore averaged from \$8 to \$10 per ton. The ore was a white, saccharoidal quartz, but little stained, as far as I saw it. The most important work, that has been done on the lot, resulted in an open cut, in the northwest corner of the lot, the cut reaching to the top of the hill, near the east and west lot-lines. This cut exposed five veins, which are about fifteen or twenty feet apart, varying from one to six inches in thickness. These veins are very rich, and show considerable free gold in a porous, saccharoidal quartz, very slightly stained, throughout, to a dirty-cream color, by iron sesqui-oxide. Excellent examples of the free gold in quartz from this mine are on exhibition in the State Museum, in Atlanta, the gift of Mr. James J. Packard, one of the owners of the property. These are very attractive specimens. Besides these five small veins, there are other very thin, ribbon veins. The open cut is about two hundred feet long, by about forty feet wide at the top, and about thirty feet deep. The rocks, exposed by it, consist of gray mica-schists, the saprolite of which,

near the top of the cut, varies from red to yellow. At the bottom of the cut, the mica-schists are only partially decomposed, and are too hard, to be worked by hydraulic mining. The hard schists appear, at from fifteen to thirty feet below the surface. The gold is said to occur, both in the schistose saprolite and in the quartz veins, running through it, in a ratio, usually of one to one. The hard schists are said to contain gold, in varying quantities. I was informed by Mr. Bryson, who guided me over the property, that, at the top of the cut, the veins were about thirty feet apart; but they are now from fifteen to twenty feet apart, at the bottom of the cut. Just west of this cut, a great deal of gold was obtained, by washing the surface of the hill with a hydraulic giant, for a depth of from one to two feet. About one thousand square feet have been thus worked. Lying west of the upper end of the open cut, is what is known as *The Sulphuret Vein*, a small vein, of from four to six inches in thickness, which outcrops lower down the hill. At the point of outcrop, samples taken by the owners, were submitted to Mr. W. R. Crandall, M. E., of Dahlonega; and these yielded \$5.57, as a general average of the vein at that point. Another quartz vein, six inches in thickness, passes through the lot, about its center, outcropping on the north side. No work has been done on this vein; but samples, taken, by the owners from the surface, for assay, yielded \$3.00 or \$4.00 per ton, when assayed by Mr. Crandall.

In 1867, Dr. M. H. Van Dyke did some prospecting work on this lot, running a tunnel from the bottom of the hill, just east of the mill, for 150 feet, hoping to strike the 12-foot vein. His work was stopped by the hard mica-schists, encountered.

The property, at the time of my visit, had been idle, for some time; and it was not in such condition, that I could get suitable samples for assay.

The Mill is a 10-stamp mill of the F. W. Hall patent, with 450-pound stamps. It has two 8-foot amalgamated copper plates, and is operated by a horizontal engine, with 10-inch stroke, steam being generated by a 60-H.P. boiler. In addition to the mill, there is, in the mill-house, a Blake pump, with a 6-inch discharge, elevating the water to the open cut, for use in hydraulicking with the giants. A line, 3,300 feet long, of excellent iron pipe, for this purpose, extends from the mill to the cut, about one thousand feet of which is Leffel solid-iron pipe, the remainder being spiral sheet-iron. A small dam, across the branch at the mill, is in good condition, except that much of the earth filling is washed away. The mill, mill-house, pump, and all other mill appliances, are in excellent condition. A good flume, about 3,200 feet long, extends from the lower end of the cut to the mill, with a fall of 321.2 feet. The cut has a fall, from the upper to the lower end, of about thirty feet. Since the purchase of the property by THE TURKEY HILL GOLD MINING CO., it has been operated by them, to a limited extent. Messrs. Frank S. and James J. Packard, of Sturgis, Mich., are the two principal owners, in this company.

Lot 163, 11th district, originally Hall, now Lumpkin, county, was conveyed, in March, 1837, by Benjamin Wallace to The Pigeon Roost Mining Co., under a warranty deed. It was sold, May 1st, following, by the sheriff, to Allen E. Mathews and Franklin Summerour, at the suit of Elisha Castlebury against The Pigeon Roost Mining Co. On June 6th, 1848, deeds were made by Ann Mathews, widow of Allen E. Mathews, deceased, and Franklin M. Cabot, administrator of the estate of Allen E. Mathews, deceased, the latter deed being to Malachi Burns, for the undivided half of the "mines and minerals" of this lot. In January, 1857, "all of 163" was sold, by the sheriff, to Daniel Neisler, at the suit of Lemuel

near the top of the cut, varies from red to yellow. At the bottom of the cut, the mica-schists are only partially decomposed, and are too hard, to be worked by hydraulic mining. The hard schists appear, at from fifteen to thirty feet below the surface. The gold is said to occur, both in the schistose saprolite and in the quartz veins, running through it, in a ratio, usually of one to one. The hard schists are said to contain gold, in varying quantities. I was informed by Mr. Bryson, who guided me over the property, that, at the top of the cut, the veins were about thirty feet apart; but they are now from fifteen to twenty feet apart, at the bottom of the cut. Just west of this cut, a great deal of gold was obtained, by washing the surface of the hill with a hydraulic giant, for a depth of from one to two feet. About one thousand square feet have been thus worked. Lying west of the upper end of the open cut, is what is known as *The Sulphuret Vein*, a small vein, of from four to six inches in thickness, which outcrops lower down the hill. At the point of outcrop, samples taken by the owners, were submitted to Mr. W. R. Crandall, M. E., of Dahlonga; and these yielded \$5.57, as a general average of the vein at that point. Another quartz vein, six inches in thickness, passes through the lot, about its center, outcropping on the north side. No work has been done on this vein; but samples, taken, by the owners from the surface, for assay, yielded \$3.00 or \$4.00 per ton, when assayed by Mr. Crandall.

In 1867, Dr. M. H. Van Dyke did some prospecting work on this lot, running a tunnel from the bottom of the hill, east of the mill, for 150 feet, hoping to strike the 12-foot vein. His work was stopped by the hard mica-schists, encountered.

The property, at the time of my visit, had been in the hands of the same owner for some time; and it was not in such condition, that I was able to take samples for assay.

The Mill
pound stream
operated to
generated
in the mill
the water
A line, 300
tends from the
Lefel, 300
small dam, 200
cept that mill
house, 300
A good dam
the cut, 300
from the
purchase
it has been
S. and J.
owners

Lot 1
was conveyed
Roost, 300
following
merchandise

ing
AME
187
187
187
187

Bennett against George W. Smith. In June, 1866, Franklin Summerour sold the other undivided half of "all mines and minerals" of this lot, to Daniel Neisler. On September 6th, 1876, the sheriff of Lumpkin county sold, to Samuel Stephens, an "undivided half of all mines and minerals," to satisfy a judgment of the Court, in favor of Henry C. Kellogg against Malachi Burns. In November, 1888, Martha J. Stephens and others gave a quit-claim deed to Henry C. Kellogg, to "an undivided fourth mineral interest and mining privileges" in this lot; and, in December, 1889, M. M. London, executor of the estate of Daniel Neisler, sold to John T. McLendon all the farming interest, and one undivided half of the mineral interest, in this lot. In the latter part of January, 1890, A. L. Keith, administrator of the estate of Samuel Stephens, deeded a fourth mineral interest in lot 163 to John T. McLendon; and, about two weeks thereafter, O. T. Kellogg sold an undivided fourth of the mineral interest and mining privileges in the lot to McLendon. In February, 1893, Conway B. Thrasher gave a quit-claim deed to Frank B. Pratt to all of 163, known as the Turkey Hill Gold mine; and, about a year after, Pratt sold, to Frank S. Packard and James J. Packard, an undivided half interest in this lot. On May 15th, 1894, Frank S. Packard, and James J. Packard deeded all of lot 163 to The Turkey Hill Gold Mining Co., "except and reserving, for F. S. Packard, Jas. J. Packard and Frank B. Pratt, one acre each, where they may select, for agricultural and residence purposes, said reservation not to interfere with the mining interest." This conveyance is by warranty deed.

THE CALHOUN MINE¹

Hardly so much, of historical interest, attaches itself to any other gold mine in Georgia, as to THE CALHOUN MINE; first, because it is strongly claimed, that the first discovery of gold in Georgia, by the white man, was on this property; and, second, because it was owned for more than forty years, by that illustrious statesman, Hon. John C. Calhoun, United States Senator from South Carolina, and his heirs. A sketch of the discovery of gold, and the purchase of the property by Senator Calhoun, is given on pages 271 to 274 of this bulletin.

The property is located three miles south of Dahlonega, along the southern and eastern banks of the Chestatee river, and consists of two fractional lots, *Nos. 164 and 165, of the 250-acre class, amounting to 475 acres, more or less, in the northern part of the 11th district*, now in Lumpkin county, but, originally, a part of Hall.

At the time of the discovery of gold on the property, it was owned by Rev. Robert Obarr, a Baptist preacher. Mr. Obarr subsequently sold the property to Judge Underwood, who, soon afterwards, sold it to Senator Calhoun. Shortly after it came into the possession of the latter, Mr. John Parks, nephew of the discoverer of gold on the property, found a remarkably rich ore-shoot, at the point, now known as The Lawrence Cut. This discovery was made known to Messrs. W. G. Lawrence and Charles Sisson, who secured a lease on the property, for thirty days, during which time, it is stated, on the authority of Col. Robert H. Moore, for many years an officer in the United States branch mint at Dahlonega, that \$24,000 in

¹ Field-work by S. W. McCallie, Assistant Geologist.

gold was taken from the property. The following is a statement of Col. Moore:—

“ I knew the Calhoun lots, when Lawrence and Sisson worked the same; and, of my own knowledge, they had a lease for thirty days; and they actually made \$24,000 in gold, or, at least, they paid rent or royalty at the rate of 25 per cent. This I know from my own personal knowledge. This lease was given by Gen. Hansell, who now lives at Roswell, agent for Calhoun, for only thirty days, until Calhoun could be heard from; and, when heard from, he refused to lease, and the work was stopped. Later, a son-in-law of Calhoun, by the name of Clemson, worked the property, for some time; but I do not know the yield. About this time, I left the county, and know nothing of my own knowledge, only from hearsay; but the history of that lot is well known, and considered by all old miners good. A man by the name of Pasco worked still later, and reported ore worth \$40 per peck, or \$160 per bushel.

At the expiration of this thirty-day lease, Senator Calhoun's son-in-law, Mr. Thomas G. Clemson, took charge of the property; erected a 4-stamp mill on the Calhoun branch; and worked the mine, for two or three years. From this time, no work was done on the property, until 1847, when Mr. Samuel Pasco secured a lease on it, for a term of five years, and worked many tons of the Calhoun belt, which, it is said, proved very profitable. From this time, the mine was again idle, until 1858, when Mr. John Huff, who is, at present, in charge of the property, did considerable placer-work along the branch- and river-bottoms. From this time, until 1879, when it was purchased by Mr. J. A. Bostwick of New York, under the name of The Calhoun Gold Mining Co., a limited amount of placer-work was done, from time to time. In the meantime, the property had been purchased by Mr. Patrick Calhoun of Atlanta, at the partition sale, for division among the heirs of Senator Calhoun. Mr. Bostwick's purchase was from Mr. Patrick Calhoun.

The former immediately began extensive preparations, for working the property, and erected a 40-stamp gold mill; a large Blake duplex pump, with a capacity sufficient to elevate 100 miner's-inches of water 300 feet, to the top of the ridge; and other mining machinery, consisting of iron pipes, a hydraulic giant etc.; they, also, built an extensive dam across the Chestatee river, to supply water for the mill and mine. These improvements cost \$40,000. Mr. John Congdon, of New York, was made Superintendent, and Mr. A. J. Reese, of Dahlonega, Assistant Superintendent, of the company, in charge of the mines and mill. These were operated, for about a year, when both the superintendent and assistant superintendent died; and, in November, 1885, Mr. Bostwick donated lot 164, with the mill and all other improvements, to The North Georgia Agricultural College, at Dahlonega. Subsequently, in August, 1892, he made a gift of lot 165, to the same institution. The trustees of the college leased the mine at once, to Mr. W. R. Crisson, who worked it for two years, they receiving royalties from him, which greatly aided, in paying the expenses of the college. Mr. Crisson's work was stopped, by the carrying away of a large part of the dam, by a tremendous freshet; and, the college having no funds to rebuild it, the mill and mine have remained idle, ever since, except some small operations in the gravel-placers, this being continued to the present time. It is estimated by the trustees of the college, that it will require, from \$8,000 to \$10,000, to repair the dam, and put the plant in first-class condition.¹ There is, on the Dunagan lot (165), from twenty-five to thirty acres of auriferous gravel, and, on lot 164, twelve acres of it, no part of which

¹ Since the field-work was done, on this property, it has been sold to Mr. S. M. Wharton, of East Spokane, Wash., who has rebuilt the dam, and is putting the mill and plant in first-class condition, to resume active operations.

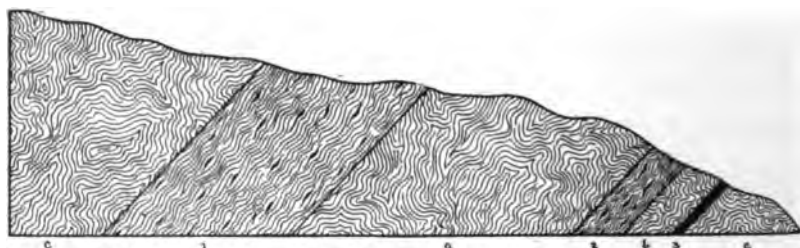
has yet been worked; and, on the entire property, there is two miles of river-bed, which has never been dredged. In addition to the auriferous gravel on the two Calhoun lots, I was informed, that there were twelve acres of unworked material of the same sort, on the northern part of lot 169, which belongs to Col. W. P. Price, President of the Board of Trustees of The North Georgia Agricultural College, but which, I was told, goes with the Calhoun property. The gravel on these lots is from three to five or six feet thick. Mr. Huff, who is in charge of the property, and who was working it, on the occasion of my visit there, told me, that, out of a superficial area of 600 square feet of the gravel, he, with two men, took 180 dwts. of gold in one month; and that, out of a like area of 1,250 square feet, he took 360 dwts. of gold, in a little more than a month, all of the latter work being done by the use of a hydraulic giant and a hydraulic elevator. He stated, that, if he had had plenty of water, twice the work could have been accomplished, with the same expense. The entire gravel, worked, will hardly exceed twenty acres. It is highly probable, that the greater part of the old placer work will pay for re-working; while the results, from the new work, are indicated in the statement of Mr. Huff, just quoted. The over-burden varies from ten to fourteen feet. It is necessary to use the hydraulic elevator, in much of the unworked area, along the river. With the mill in operation, pipe-lines could be run, that would supply an abundance of water to any part of the gravel placer. The branches are insignificant, and not sufficient, to afford enough water, for working the placers with the hydraulic giant, to any degree of satisfaction. A pit, being worked, at the time of Mr. McCallie's visit, most of which covered old work, had produced up to date, 1,100 dwts. of gold, averaging about \$1.25 per square yard of underlying schist.

The mine was not in condition, to show up the extent and character of the ore-bodies, most of the excavations being partly filled with earth. Little direct information could be secured, concerning the veins. There are, on the property, several large open cuts, and many small cuts and tunnels, which have followed the rich ore-shoots, down to the depth of forty or fifty feet, in the hard rock. Most of the work, however, has been in the saprolite. There is one well-defined vein on the property, known as *The Peachtree Vein*, and two gold-bearing belts. The Peachtree Vein lies between the schists, dipping, at an angle of about 30° , to the southeast. This vein varies from a few inches to three feet in width, and can be traced on the property, for a mile and a half. It consists of a white quartz, containing iron-stained cavities, resulting from the decomposition of pyrite; occasionally, this mineral occurs unaltered. *The Lawrence Belt* consists of auriferous mica-schists, with a considerable number of small quartz stringers, all through it, varying from one to six inches. This belt is from one hundred to two hundred feet wide, and extends from one side of the property to the other. The gold occurs in the decomposed schists, as well as in the small quartz veins. *The Parker Hollow Belt* is much like the Lawrence, as a stringer-lead. It varies from fifty to sixty feet in width, extending a mile and a half through the property. All the veins and ore-shoots increase in sulphides, with increasing depth. The country-rock consists of a dark-colored mica-schist, containing garnets. It strikes about N. 30° E., and dips, at an angle of from 30° to 45° to the southeast. Figure 37 is a section across the property, showing the Peachtree vein and the two auriferous belts, with their positions in the schists. Two samples of ore were taken by Mr. McCallie from the Peachtree vein, the other ore-bodies not being in condition for sampling. These gave assay-results, as follows:—

No. 1----- 1.010 ozs. (\$20.88) of gold per ton
 " 2----- 0.125 " (2.58) " " " "

The Mill on this property, which is located on the river, is a 40-stamp mill, with 450-pound stamps. It is operated by a large turbine wheel, with a 12-foot head of water, from the dam, across the Chestatee river. The Blake pump etc., have been described above. The pump, also, is driven by a large turbine wheel. The wood-work about the mill is in need of some repairs. All the machinery seems to be in very fair condition. There is, on the property, in tolerable condition, 1,500 feet of 12-inch flange-pipe, 600 feet of 7- and 8-inch sleeve-pipe, and a hydraulic giant.

Fig. 37



Section through the Calhoun Property. 1. The Lawrence Stringer-Lead. 2. The Parker Hollow Stringer-Lead. 3. The Peachtree Vein.
 a, b and c. Belts of Mica-schist.

It has already been related, how the property came into the possession of Senator Calhoun, in the early part of the third decade. Since then, the transfers of lot 164, as recorded in the Court-house of Lumpkin county, are as follows:— On June 3rd, 1879, the lot was sold, for partition, to Patrick Calhoun, at the instance of Margaret M. Calhoun, Sr., John C. Calhoun, Margaret M. Calhoun, Jr., and Patrick Calhoun, as plaintiffs, against John C. Calhoun, Benjamin P. Calhoun, William Lennols Calhoun, Thomas G. Clemson, Gideon Lee, Elizabeth Calhoun, Isabella Lee and Andrew P. Cal-

houn, tenants-in-common, as heirs-at-law of the late Hon. John C. Calhoun, of South Carolina. In October, 1879, Patrick Calhoun gave a warranty deed to this lot to The Calhoun Gold Mining Co. On November 2nd, 1885, a quit-claim deed to it was given, by this company, to The North Georgia Agricultural College, the area of this lot being stated, as $229\frac{1}{2}$ acres.

THE CHESTATEE MINE

The Chestatee Mining Property consists of *lots 144, 145, 146 and 167, 11th district, and 1,041, 1,042, 1,092, 1,186 and 1,187, 12th district*, all being fractional lots, lying along the Chestatee river, except 146, in the 11th district, and 1,092, in the 12th district. The river divides the two districts, the former lying south and east, and the latter, north and west, of it. As has been previously stated, the lots of the 11th district are 250-acre lots, while those of the 12th are 40-acre lots. There are, in all, probably between 650 and 700 acres in this property, much of it consisting of a vast expanse of beautiful valley-land, with low ridges encircling it, and the river wending its way through its center. Two or three dredge-boats had been, for some time, having excellent success, recovering gold, by dredging and sluicing gravel, from the bottom of the river, at various places along its course. The Chestatee Mining Co., composed largely of gentlemen of means, from St. Louis, Mo., with Mr. J. D. Thompson, as President, and Mr. W. R. Crandall, as Mining Engineer and General Manager, purchased these lots, and determined to turn the river into a new channel, to be cut through the adjacent bottoms, on the north side; and to work the river-bed for

gold, which, they reasonably supposed, would be found, in paying quantities. To carry out this plan, extensive preparations were begun, in 1893. A large, but short, canal was constructed, some of it, by blasting out the hard rock, to bring water, from a dam across the river to two 66-inch Leffel turbine water-wheels. A 12x24-inch Blake duplex pump, with a capacity of 1,000 gallons per minute, under a pressure of from 50 to 60 pounds per square inch, was purchased, and mounted in place; as were also a 25 H.P. electric motor, of the C. & C. type, with a 50 H.P. generator, and a smaller electric motor. All this machinery was new; and good substantial houses were built for its protection, and for other purposes. This plant was located at Neisler's ford. One of the turbines was used to actuate the pump, which supplied water, under a 60-pound pressure, through a 9-inch pipe, to the hydraulic giant, and to a portable hydraulic gravel-elevator, devised by Mr. Crandall, and described by him, before a meeting of the American Institute of Mining Engineers.¹ The water is divided at a convenient point, a 5-inch pipe supplying the hydraulic elevator, and a 7-inch pipe, the giant. The latter is used, for washing off the over-burden of alluvium from the gravel, in the bottoms lying along the river; and the débris, thus washed off, is taken up by the elevator to a flume above, which conveys and discharges it into the river, below the dam.

The other turbine actuated the 50 H.P. generator, which furnished electricity to the 25 H.P. electric motor, and to the smaller motor, used for pumping water direct from the river, for washing the gravel in sluice-boxes, for the gold. The plant was designed, so as to work, day and night, the electric generator furnishing light, as well as power. The water-power is a shoal, with a six- or eight-foot fall.

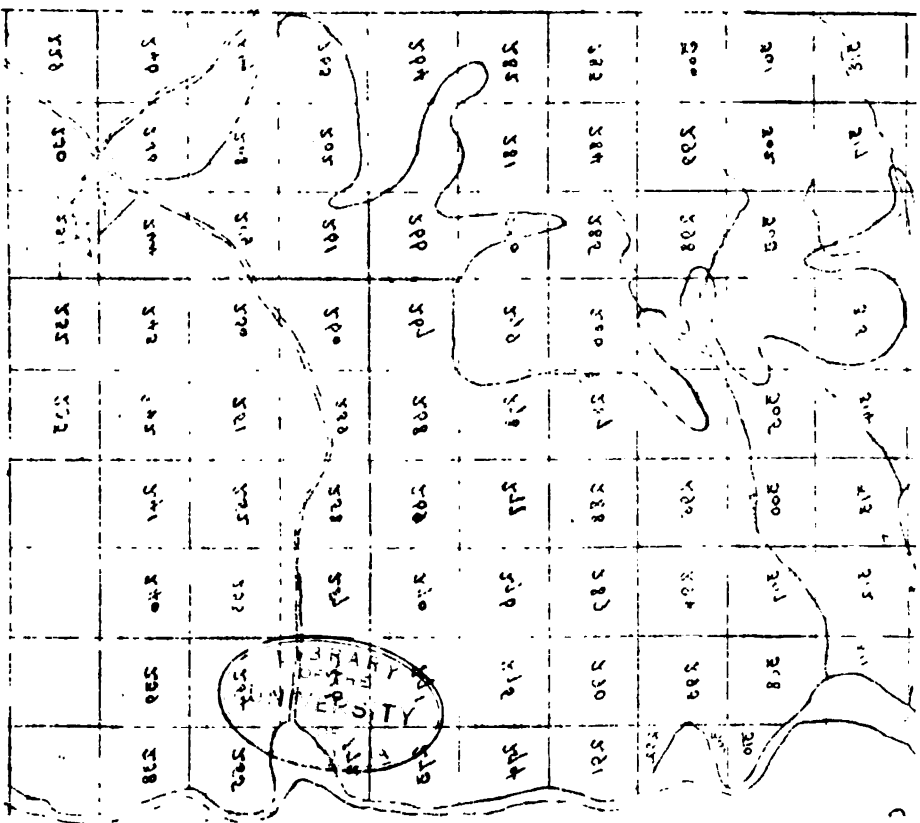
¹ See Trans. Amer. Inst. Min. Eng., Vol. XXVI., 1896, p. 62.

The work of excavating the new channel, for the river, was begun in 1895; and the excavation was made about thirty-five feet wide, and as deep, as the underlying hard schists would permit. Its location varies, from 50 to 200 yards from the north bank of the river, with which it trends, in almost parallel lines. I was informed by Mr. Crandall, that the gold, saved from the gravel taken out, about paid the expenses of excavating. After extending this excavation, so as to expose 400 or 500 yards of the river-bed, it was found, that, on account of the water's running quite swiftly, along that section of the river, the bottom consisted of smooth schists, with comparatively little gravel on it. A large amount of money had been spent on the plant; and, when the company learned, that, after all the work and expense, little gold would probably be found, to repay this great outlay, operations were stopped, and the property was sold, for a comparatively small sum, to Mr. Frank W. Hall, of Dahlonega, to whom the company was indebted. There is still a large placer area, that has never been worked. The beds, along the small branches coming down from the hills, are said to be quite rich. It is believed, that considerable gold will be found in the gravel-beds, extending from the river to the foot of the hills, of which there are 200 acres, only thirty having been worked; and that the veins in the ridges, which have not been prospected, will prove to be valuable. Some work was done, years ago, along the small branches, which flow from the hollows on the ridges; and the results are reputed to have been very satisfactory. A pocket, in a small vein, about half way up the ridge, on the south side, worked by James M. Adams, yielded \$750, the lot belonging, at that time, to Mr. Alexander Whelchel (pronounced *Wilkie*). There are several old tunnels on the south ridge, worked years ago, in a small way. While operating along the river, Mr. Crandall also did

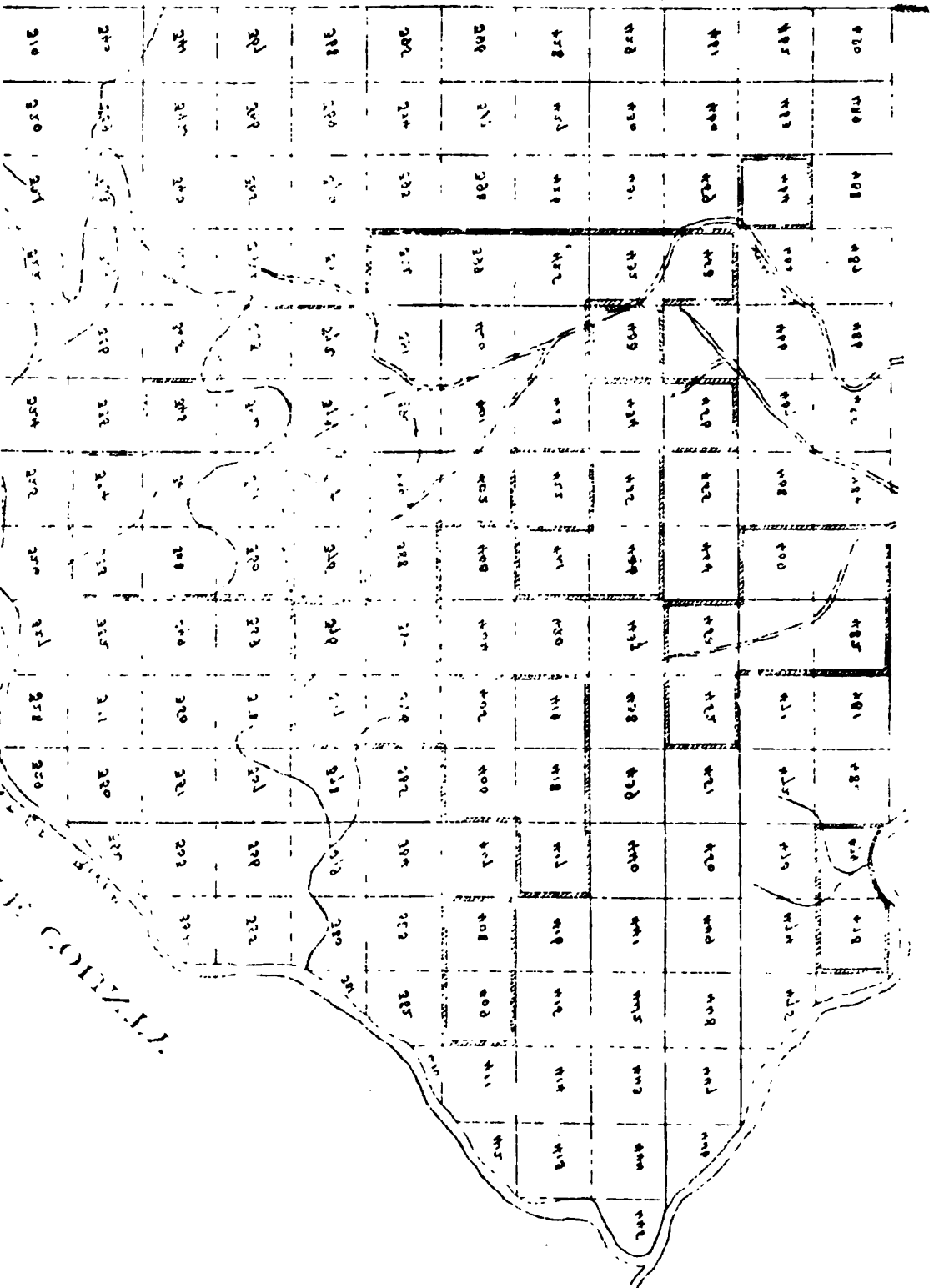
a little prospecting on the south ridge. Near the top, he drove a short tunnel, in a southeast direction, to cut an auriferous quartz vein, and followed the vein, by test-pits, along the top and west side of the hill, for a distance of, probably, 400 yards, to a point, where now is to be seen a narrow open cut, on the southwest side of the hill. This cut, on the side of the hill, is in the nature of an approach to a tunnel begun, but carried no further. It is about thirty feet long. The material through which it is cut, consists of a soft, cream-colored, schistose saprolite, the original rock of which is completely decomposed, except, that, along the fracture-lines, are folia of a green chlorite, resembling clinocllore. This mineral has undergone some alteration. The ore-body, exposed by the cut, consists of small quartz stringers in the cream-colored saprolite; these vary from a sixteenth of an inch to four inches in thickness. The ore-body is from five to six feet thick. The stringers and the schists strike N. 60° E., and dip, at an angle of 60°, to the southeast. About a hundred yards northeast of this opening, along the trend of the vein, between this cut and the Crandall tunnel, is an old incline shaft, said to be fifty feet deep, and to have been worked, fifty years ago. It was filled with caved material, which was covered with leaves, to within six feet of the top. The material, through which it was sunk, was of the same character, as that just described; and the vein was easily seen, on the north and south walls of the shaft, the latter having followed the vein down, along its dip. The strike of the vein was N. 10° E., and its dip, 70° to the southeast. At this point, the vein was 30 inches thick, and not at all of a stringer character. From one of the walls of the shaft, I took out several large slabs of the partially disintegrated quartz. It was filled with a great many iron-stained cavities (hematite); and, on being broken across, it showed a large quantity of pyrite, disseminated through

SECRET
M.H.D.

My friend
B5742



Disposal



it, in particles about the size of duck-shot. These specimens, and those on the old dump, at the mouth of the shaft, which were of the same character, proved, that the ore, in its unaltered condition, was, to a large extent, of a sulphide nature. No sample for assay was taken from this point.

About 150 yards northeast of the old shaft, along the trend of the vein towards the Crandall tunnel, was a small, square, prospect-pit, on the west side of the hill, which I have designated as *Pit No. 1*. This was only four feet deep. The vein, here exposed, was one foot thick, and the quartz was banded and speckled with pyrite, and of the same character, as that from the old shaft just described, except it was very little decomposed. Some of the particles of pyrite, in the quartz, were entirely decomposed; others, not at all. The vein was intercalated in the schists, and trended due north, dipping at an angle of 50° to the east, while the dip of the schists was 65° to the east. A sample for assay was taken from this point, the result of which is given in No. 1, below. Several other pits of this kind were examined, along the trend of the vein; but they furnished nothing worthy of note. The last opening, along the vein, in a northeast direction, is *The Crandall Tunnel*. The entrance to this is from the north side of the hill. It is about twenty-five feet long, and is driven, at right angles, to the strike of the decomposed schists, which is N. 25° E., with a dip of 40° to the southeast. The schists, in the rear part of the tunnel, are biotite fl  sser-schist, the biotite, in part, altered to a dark-green chlorite. At the rear end of the tunnel, a three-foot auriferous quartz vein is encountered, which consists of a finely saccharoidal quartz, containing much pyrite, in which alteration to melanterite has begun. A section across this vein was taken as an assay sample, the result from which will be seen in No. 2, below.

Parallel with the general trend of this vein, and adjacent to it, on the northwest, is a dike of hornblende-schist, of from 150 to 200 yards wide, in all particulars similar to those, passing through, and north of, Dahlonega. Its trend is N. 50° E., and the dip of the schists, 50° to the southeast.

The samples, taken, as indicated, were submitted to assay, in the laboratory of the Geological Survey, by Dr. Thomas L. Watson, Assistant Geologist, with results, as follows: —

No. 1	-----0.15 oz.	(§ 3.10)	of gold per ton
" 2	-----0.65 "	(§13.43)	" " " "

Since Mr. Hall has owned the property, he has built an additional house, at the power-station, and given the buildings two or three coats of paint, for their protection, at the same time adding much to their appearance.

THE CAVENDER'S CREEK MINING PROPERTY

A large number of lots, occupying a considerable area of the northeast end of the gold belt in Lumpkin county, north and west of the Chestatee river, are owned or controlled by Capt. R. R. Asbury, of Pleasant Retreat, White county, Ga., and gentlemen associated with him in this enterprise. While a little vein mining has been done on a number of these lots; yet, no mines among them have become prominent, so far. A little work was done, some years ago, by Capt. H. D. Ingersoll of Dahlonega, on one or more of the lots; but his results were not satisfactory, and the work was not prosecuted to any considerable extent; still, the ore from several of the lots shows such good results, when submitted to assay,

as will be seen, beyond, **that further** development may prove this to be a very valuable property. The lots on which the veins have been opened and prospected, in a limited way, including those, on which a little work has been done, are 360, 361, 373, 376, 377, 386, 388, 389, 390, 391, 400, 424, 425, 432, 454, 455 and 458, *all in the 15th district*. The other lots embraced in this property are Nos. 311, 323, 324, 333, 334, 344, 346, 347, 348, 392, 399, 405, 406, 408, 409, 417, 418, 438, 452, 453, 456, 469, 470, 483, 485, 492, 499, 506, 507, 509, and an undivided half of 401, 423 and 464, *all in the 15th district*. All these are 40-acre lots, except five fractional lots, along the river. In addition to these, they own or control, of the Spencer Mill tract, five acres of lot 230, 20 acres of lot 231, and five acres each of lots 244 and 245, *also in the 15th district*. Further, they own the water-rights on all streams between Cavender's creek and the Spencer Mill property, with the right-of-way for a ditch through the intervening lots to the Cavender's Creek property. Some idea of the extent of this property may be had, by referring to the map of a part of the 15th district,¹ showing the lots belonging to these gentlemen, marked with a certain border.

In the early days of gold mining in this county, when all the branches and bottoms were worked for the gold in their gravel deposits, the lots, constituting this property, had a good reputation; and even now, some placer work is carried on, from time to time, along the branches. It is said, that these placers have produced \$150,000, taken out by miners, using the long-tom and rockers. No hydraulic mining has ever been done on it. Parts of these placers have been worked over, two or three times, but most of it, only once. About half of the gravel-placer area has not been worked,

¹ See map, p. 504.

at all. This includes the numerous dry hollows, which have been left untouched, for want of water.

On lot 424, only a short distance from Grindle's saw-mill, which stands on the north bank of the creek, four miles east of Dah-longa, is a small cut, where a limited amount of work has been, and is now being, done, on an auriferous vein, known as *The Calico Vein*, from the fact, that the saprolite of the mica-schists, at this point, is beautifully variegated, a rich pink coloring the kaolin, which is somewhat abundant, being the prevailing color. The vein is about 12 inches wide, and gives fair results to the miners working it. It is believed, that this vein is a continuation of one of the veins from lots 390 or 391. It was being worked, in a small way, at the time of my visit. Specimens of hornblende-schist, containing pyrite, said to yield a very small amount of gold, were secured by me from this lot.

On lot 391, is a small open cut, on a stringer-lead, which is ten feet wide on the rear wall of the cut. An incline was sunk, some years ago, on this vein, at an angle of about 35° , for a short distance, down; and the vein was stoped from a tunnel, 200 feet long, the stope being forty feet, in a perpendicular direction. This is the only work done on the Cavender's Creek property, except on lot 424, as stated above, and a short prospecting tunnel and stope, on lot 390. The ore-body, which was stoped on lot 391, trends N. 40° E., and dips 65° to the northwest. It consists of quartz stringers, from the thickness of a sheet of paper to five inches thick, at the top, and four feet thick at the bottom of the incline. The quartz is white, saccharoidal, somewhat pitted and brown-stained, from the decomposition of pyrite in small quantities. The mica-schists have the same dip and strike, as the vein. A sample of this ore was taken from this exposure. That part from the bottom of the incline, in

addition to being iron-stained and quite cellular, contains a little unaltered pyrite, here and there. The results of assay from this sample are given in No. 3 in my assay-list below. Not long since, Mr. W. R. Crandall, M. E., of Dahlonega, made an examination and report on this property. Further on, I have quoted, from this report, assays, made by Messrs. Crandall and George P. Good & Co., of Atlanta, from samples taken by Mr. Crandall. His sample No. 10 was taken from this ore-body.

Vein No. 1 lies about two hundred yards east of Vein No. 2, in the northeastern corner of this lot. This vein is twenty-five feet wide, and is composed of large masses of white, iron-stained quartz, intercalated in mica-schist, much of which is cellular, and of good appearance. Only a slight opening has been made in this vein, at this point, which is on the south side of the hill. Its strike is N. 40° E., parallel with Vein No. 2; and it has the same dip. In this ore, there were small quantities of pyrite. An assay sample was taken by me from this exposure, the result of which will be seen in No. 2 of my list of assays, beyond. Mr. Crandall's sample No. 9 was taken at the same point. Scattered over the top of the hill above the vein, I observed a good deal of hornblende-schist.

In the trend of this vein, on the opposite side of the hill, near its top, was an opening on a quartz vein, four feet wide, on lot 373, near its southwest corner. The quartz is of the same character, as that at the opening on Vein No. 1, just described, though it is more iron-stained, and the iron oxide is hematite, nearly black in color. The vein has the same strike and dip, as at the opening on Vein No. 1; and it is, unquestionably, the same vein. The sample for assay, which I took from this point, is No. 4, in my assay-list, below. Mr. Crandall's samples Nos. 1 and 2 were taken from this point.

In the northeast corner of lot 390, quite near the corner, is a vein, similar to that on lot 373; and, like it, it has a width of four feet, at the point of exposure; and its strike and dip, and that of the schists, are the same, as those on lot 373. The sample, which was taken by me from this point, is No. 7 of my list of assays, below. Mr. Crandall's sample number, from this exposure, is 3 of his sample-list.

On lot 389, near the northwest corner, at the top of a hill, are two shallow trenches, about ten feet apart, which expose two veins, respectively, eight inches and fourteen inches in thickness. It is said, that these two veins are the same as the vein on the Jumbo lots, 374 and 375, owned by Judge W. W. Murray and others. My assay sample from this point was taken from both veins, and is numbered 5, in my assay-list, below. Mr. Crandall's numbers are 4 and 5, he having taken a sample from each opening.

At the foot of this hill, on lot 390, is a stringer lead, forty feet wide, composed of quartz veins, intercalated with auriferous mica-schist. They strike N. 40° E., and dip, at an angle of 60° , to the northwest. Sample No. 6 of my assay-list was taken from this point. Mr. Crandall's assay number, for material taken from the same exposure, is number 6 of his sample-list.

On the west side of this lot, a tunnel, 175 feet long, has recently been driven, cutting twelve small stringer-veins, supposed to be the same auriferous lead, as that on the other side of the lot, described above. These stringer-veins vary from five to twelve feet apart, and are from five to fourteen inches thick. The material is a very rich-looking, iron-stained, more or less cellular saccharoidal quartz, with part of the auriferous mica-schist clinging to each side, where the quartz is in contact with the schist. Here and there, it contains some pyrite, unaltered. It is said, that the mica-schist, be-

tween the stringers bears considerable gold. I was not able, at the time of my visit, to examine the veins, and take a sample, directly from them; but, there were several small piles of ore, which had been taken out, and dumped near the entrance to the tunnel. From these, I selected, what I judged to be a fair average sample. As will be seen, by a comparison of the lists of assays, made from the samples, taken by Mr. Crandall and myself, there is generally not great variation, between the results of the samples, assayed for the Survey, and those assayed by Messrs. Crandall and Good & Co., except in this particular instance, where one of Mr. Crandall's samples, No. 7, gave him \$37.15, and Messrs. Good & Co., \$36.00; and the other sample, No. 8, to the former, \$78.43, and to the latter, \$85.70; while the one sample, taken by me, yielded only \$5.17. I am unable to explain the discrepancy. The veins on this lot have been cut, at a number of intermediate points, between the tunnel and the cut, at the foot of the hill, in the northeast corner of the lot, on the 40-foot stringer-lead, mentioned above.

The samples, taken by me from this property, yielded, on assay, the following results:—

No. 1	-----	0.25 oz.	(	\$ 5.17)	of gold per ton				
" 2	-----	0.99 "	(	\$20.46)	" " " "				
" 3	-----	0.20 "	(	\$ 4.13)	" " " "				
" 4	-----	1.27 "	(	\$26.25)	" " " "				
" 5	-----	0.92 "	(	\$19.02)	" " " "				
" 6	-----	0.80 "	(	\$16.54)	" " " "				
" 7	-----	1.07 "	(	\$22.12)	" " " "				

No. 1, corresponding to Crandall's samples, Nos. 7 and 8, was taken from the veins in the tunnel, on the west side of lot 390; No. 2, corresponding to Crandall's No. 9, from Vein No. 1, in the northeast corner of lot 391; No. 3, corresponding to Crandall's

No. 10, from vein No. 2, lot 391; No. 4, corresponding to Crandall's Nos. 1 and 2, from the vein, near the southwest corner of lot 373 (the same vein as No. 1); No. 5, corresponding to Crandall's Nos. 4 and 5, from the two veins, at the top of the hill on lot 389; No. 6, corresponding to Crandall's No. 6, from the forty-foot stringer-lead, at the bottom of the same hill, on lot 390; and No. 7, corresponding to Crandall's No. 3, from the four-foot vein, near the northeast corner of this lot.

When Mr. Crandall made his examination of the property, samples were taken, as before stated, from the various points, where openings had been made, which, after sampling, were equally divided between Messrs. Crandall and George P. Good & Co., of Atlanta, to be submitted to assay. I am permitted to quote the following, as the results of their assays:—

Sample	Lots	W. W. Crandall	Good & Co.
1-----	373-----13	dwts. 5 grs. (\$13.63)	-----\$ 3.00
2-----	"-----11	" 15 " (12.00)	----- 20.00
3-----	390-----36	" 0 " (37.15)	----- 36.00
4-----	389-----44	" 0 " (45.40)	----- 25.80
5-----	"-----16	" 9 " (9.85)	----- 1.50
6-----	390-----28	" 0 " (28.90)	----- 56.00
7-----	"-----36	" 0 " (37.15)	----- 36.00
8-----	"-----76	" 0 " (78.43)	----- 85.70
9-----	391-----26	" 0 " (26.83)	----- 10.00
10-----	"-----8	" 7 " (8.56)	----- 3.60

The Mill on the property is on lot 458, a short distance from Grindle's saw-mill; it is a small five-stamp mill, in good condition. It has, as its motor, an over-shot 16-foot wheel, supplied with water from a ditch, coming from a point, higher up on Cavender's creek. A survey was made, some time ago, by Mr. B. M. Hall,

C. & M. E., of Atlanta, for a ditch, to bring water to this property, from Spencer's Mill creek, which should be 16 miles long, and have a grade of four feet to the mile. Water for this ditch can also be had from the Chestatee river, 100 feet above Spencer's mill. If taken from Spencer's Mill creek, from 400 to 600 miner's-inches of water can be supplied. If taken from the river, 2,000 miner's-inches, or as much more as may be desired, is available. With these improvements, an abundance of water can be had, for mining this and other property. Mr. Hall gave, as an estimate for the construction of this ditch, a sum not exceeding \$10,000. Such a ditch would make available a large area of auriferous stringer-leads, on the property, where only gravel-placer mining has been possible, in the past.

A large part of this property is so situated, with reference to a long narrow hollow, that an excellent site is afforded, for a mill, that could be easily fed from all the openings, discussed above. There are extensive bodies of oak, chestnut, hickory etc., affording all necessary fuel and timber for building, at a minimum cost.

THE JUMBO MINE

THE JUMBO MINING PROPERTY consists of *lots 374 and 375, 15th district*. These lots were formerly known as The Williams Lots. Judge W. W. Murray of Huntingdon, Tenn., owns a $\frac{5}{8}$ interest in these lots, and friends of his own the remainder.

This prospect has been little worked, because there is not sufficient water on the lots, to enable one to operate a hydraulic giant, and no mill on the property, that could be used for crushing the

ore, which would be carried to the mill by flume, if the hydraulic method were in use. There seems to be a large amount of low-grade ore on the lots, in the form of an auriferous saprolite belt, 300 feet, or more, in width. This crosses a low, oval hill, on which was sunk, some years ago, the only shaft, on the property. It is possible, to pan particles of gold from almost any point on this belt. I saw a number of pansful, taken from different points on the belt and panned; and, in almost every case, particles of gold resulted from the panning. Samples of the soft, decomposed mica-schist belt gave the following results, when submitted to assay:—

No. 1	-----	0.01 oz.	(\$0.21)	of gold	per ton
" 2	-----	0.02 "	(\$0.41)	"	" " "

Bearing in mind, that, by the hydraulic method, this material, which is in great quantity, can be mined and milled for 12 cents per ton, it will be seen, that even these low values will yield good returns, when hydraulicked economically, and with good judgment, if water were brought to the top of this hill, with a sufficient head, to hydraulic these mica-schists. A great desideratum, in this part of the belt, is such a water-supply canal, as the Hand ditch. If the Cavender's Creek ditch, surveyed by Mr. B. M. Hall, should be constructed, the value of the Jumbo property would be greatly enhanced; for these lots are completely surrounded by the Cavender's Creek property.¹

The shaft, above mentioned, is on a small quartz vein, which probably averages twelve inches, or more, in thickness. It was originally about thirty-five feet deep; but the sides have caved in, to some extent, covering the vein, at the bottom. The vein, along the wall of the shaft, dips, with the schists, at a steep angle. This vein has been traced, by means of a trench, for a distance of prob-

¹ See map of a part of the 15th district, p. 504.

ably a hundred and fifty yards, in a southwest direction. It is in the trend of the two veins, which were prospected, a little, in the northwest corner of lot 389, of the Cavender's Creek property,¹ which yielded, on assay, \$19.02 of gold per ton. In fact, it is conceded, that this vein, on the Cavender's Creek property, is *The Jumbo Vein*.

I am informed, that there are other veins on the Jumbo lots; but these I did not see, my visit being limited, as to time, and no other occasion offering, of which I could avail myself.

There are several small streams on the property, that would have economic value, if extensive operations should be undertaken, on these lots; and there is abundance of oak, hickory and other timber, which would be available, for fuel and other purposes.

THE CORA LEE PROPERTY

Lot 433, 15th district, adjoining lot 424, of the Cavender's Creek property, on the south, has several auriferous veins, which have been prospected, only in a small way. On the largest of these veins, a trench has been dug, twenty-five or thirty feet long, exposing a white quartz vein, which, at times, shows particles of free gold. Other small trenches have been dug along this and other veins. From the position of this hill, its veins, without doubt, furnished a part of the gold in the gravel-beds, in the hollows, just below it. It is only a short distance from the 5-stamp mill on the Cavender's Creek property.

Judge W. W. Murray, of Huntingdon, Tenn., owns an undivided $\frac{3}{4}$ of this lot, and Mr. D. A. Nunn of Brownsville, Tenn., the remainder. It was formerly known as the Satterfield lot.

¹ See map of a part of the 15th district, p. 504.

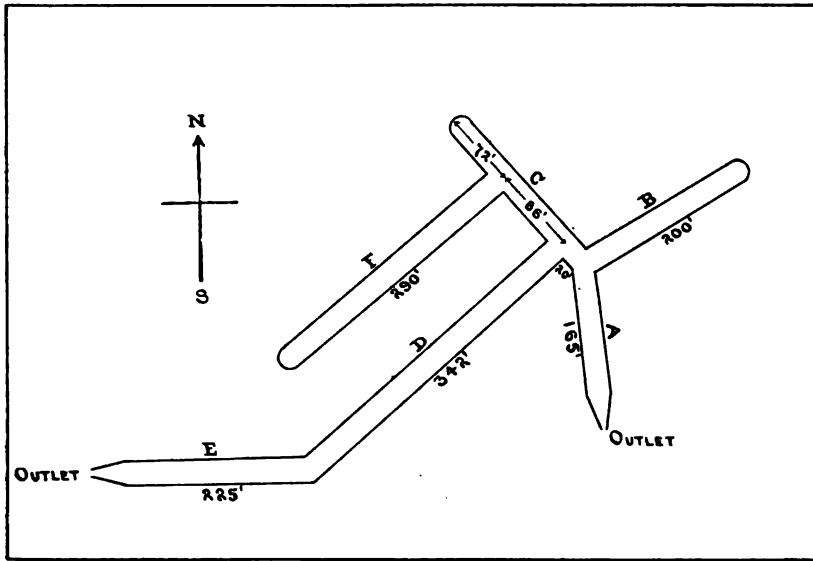
THE GARNET MINE¹

The Garnet Mining Property consists of *lots 330, 331, 350 to 359, inclusive, 378, 379, 403, 404, 439, 442, 450 and 451, 15th district.* The company also owns *lot 222*, outside of the gold belt, in this district. The property, immediately surrounding the mine, is included in the above list of lots, from 330 to 379. The other lots are from a half to three-quarters of a mile distant from this group. Of the group, on which the mine is located, five are fractional lots, lying along the Chestatee river, two of which contain nearly forty acres. The property is located, about seven miles northeast of Dahlonega. The streams, traversing it, were worked extensively, between 1840 and 1850, and are said to have been very rich. The first vein-mining, done on the property, was commenced, about 1886, by its present owners, whose corporate name is THE GARNET WATER-POWER & MINING CO., with its principal office, Room 26, 52 Broadway, New York City. At that time, an excellent mining-plant was erected, consisting of a 20-stamp mill, with stamps weighing 450 pounds each; a Blake duplex pump, a duplicate of the one at the Calhoun mine; a small dynamo, for furnishing light; two large turbine wheels, one to run the pump, and the other, the mill; and a 40 H.P. engine and boiler; all of which were well housed. A dam across the Chestatee river was used, for furnishing water to the mill, through a short canal, under a 16-foot head of water. The entire power, taken from the river, to operate the mill and dam, was 200 H.P. A reservoir was located on one of the highest hills, about half a mile from the mill, and about a quarter of a mile from the cuts. Water was pumped from the mill to this reservoir, through

¹ Field-work, in part, by S. W. McCallie, Assistant Geologist.

a 12-inch iron pipe, and the ore was sluiced to the mill, through a flume, about $\frac{3}{4}$ of a mile long, which began at the outlet of the cut, marked A in figure 38. A hydraulic giant was used, in excavating the cuts. A two-story dwelling, for the superintendent, completed the plant. The reservoir consisted of a circular canal,

Fig. 38



Plan of the Open Cuts of the Garnet Mine.

from twelve to fifteen feet wide, five feet deep, and having a length of 450 feet. The details of the lengths and directions of the cuts are given in figure 38. The width of those worked was about forty feet at the top, and from ten to thirty feet deep. The cut, marked E in the diagram, was not worked, it being used merely as an exit for material from cut D. These cuts are the result of extensive working of the garnetiferous mica-schist saprolite, which contains stringers

of saccharoidal quartz, varying from an eighth of an inch to twelve inches in thickness. The schists dip at high angles, and strike N. 45° to 55° E. I observed, at the entrance of cut F, on the north-west side, a 15-foot dike of decomposed hornblende-schist. In almost all cases, the cuts have been worked down to the hard, garnetiferous schists, which are only partially decomposed; and, at the time of my first visit, considerable débris had fallen in, covering up the veins, so that they could not be examined.

In addition to these cuts, there are, on top of the hill, a series of five or six shafts, which have been sunk, along one of the auriferous stringer-leads, to a depth of forty or fifty feet. Work was continued, for about two years. I am not informed as to why it was stopped; but I was told, that it was generally understood, that the results were satisfactory. In the latter part of 1895, work was resumed at this mine, by Mr. McManus, Superintendent, who took considerable material from these shafts, hauling it to a Griffin horizontal mill, which he had just erected, at the time of my visit. A large boiler and engine had been put in place; and he was about to begin the milling of the ore, which he had hauled. This material was a loose, sandy, decomposed, garnetiferous mica-schist, which seemed to contain a good deal of gold, judging from samples, taken promiscuously from the different piles, and panned in my presence. The plan of Mr. McManus was to mill this material, dry, hoping thereby to save a great deal of the fine "flour gold," which floated off, when the hydraulic method was resorted to. The quartz blocks in this material proved to be too hard for the mill; and it is said, that it ran, for only thirty-six hours, when it was found to be unfit for further use. Mr. McManus soon retired from this work, and Mr. H. M. Smith, of Washington, D. C., succeeded him. Operations were continued for only a year, when

work was stopped. At the time of my visit, the flume and other outdoor wood-work were entirely decayed and useless, and the roof of the mill and the flooring were in bad condition. The dam was also in need of repair; but the machinery in the mill-house was in very good condition, as was the iron piping to the reservoir. With the exception of about twenty feet, all the 12-inch pipe, from the reservoir to the cut, had been removed.

A sample, taken by Mr. McCallie, from the Negro vein, yielded results, as follows:—

No. 1 1.40 ozs. (\$28.94) of gold per ton.

OTHER MINES

THE BOLD FIELD MINE is located on *lot 1,182, 12th district*, on a vein, very rich in free gold. The lot is a fractional lot, along the north bank of the Chestatee river. The vein was discovered about 1840, and was worked, for several years, by its owner, Mr. Boling W. Field, who is said to have become wealthy, from the gold secured from this vein. The ore, it is said, was very much like that of the Findley shoot and the Whim Hill and Battle Branch mines; that is, quartz, richly impregnated with gold, in masses and wire. This vein crosses the Chestatee river. So sure was Dr. M. F. Stephenson, the amateur geologist, before referred to, in this report, that, by turning the channel of the river, he would find the vein, rich in free gold on the bottom, that he interested a wealthy gentleman of Boston, Mass., about the time of the civil war, to the extent of furnishing the money, to make the necessary preparations for the enter-

prise. Unfortunately, however, just as he was ready to begin operations, a heavy freshet swept his plant away; and work was never resumed. Whether any other attempt to mine the property was ever made, after Mr. Field discontinued work, I was not informed. The lot is now a part of the estate of Mr. Weir Boyd, deceased, of Dahlonega.

THE JONES MINE, worked years ago, is located on *lot 512, 15th district*, on the north side of the Chestatee river, near Bearden's bridge, which is on the Upper Gainesville road, four miles from Dahlonega. I was reliably informed, that, at one time, it was "a great gold producer"; but, of late years, no mining work has been done upon it.

THE BUFFINGTON MINE is an old mine, formerly well and favorably known, for the amount of its gold production; but no work has been done on it, for many years. It is near the Jones mine.

THE RUFUS C. WOOD MINING PROPERTY consists of *lots 312, 325, 326, 400, 467, 484, 485, 486, 487, 494, 495, 497, 510, 511, and half of 335, all in the 15th district*. These lots form a compact area and one of them, lot 511, adjoins the Jones lot on the east. Cavender's creek flows through this property, emptying into the Chestatee river, from lot 497, which is the only lot, that lies along the river. Auriferous veins, lying along the creek, have been opened and worked, more or less. Mr. Rufus C. Wood, of Dahlonega, is the owner of this property.

THE DRY HOLLOW MINE is located on the 250-acre lot, *No. 126, 11th district*, the northwest corner lying along the south bank of the Chestatee. Years ago, considerable work was done on this mine. The ore is quartz, containing large quantities of auriferous pyrite. No work has been done on the mine, for several years; but it is highly spoken of, by the people of Dahlonega, even though the

owner, who lives in the north, seems not to have the cordial approval of some of them, because a guard is kept on the lot, to prevent any one from visiting the mine.

THE OLD COLUMBIA MINE is a mining property lying about $\frac{3}{4}$ of a mile south of the Findley mine down near the river. Work was begun here, about 15 years ago, by THE COLUMBIA MINING CO., composed of Mr. Alonzo H. Farrar and others, of Kinderhook, N. Y. They built a 20-stamp mill, and put Capt. J. O. Robertson, now of Canton, Ga., in charge, as Superintendent. The work continued for six or eight months, when it was stopped, for some reason, which I did not learn. The company, having bought lot 988, on Findley Ridge, already described, removed the mill to the site now occupied by the Preacher mill, and began to work this lot. The Superintendent's house and other buildings, on the Old Columbia, are now in bad condition.

THE TANYARD BRANCH PLACER lies along the stream, from which it takes its name, and which rises at the foot of Crown Mountain, on lot 949, and flows, almost east, along the north side of Findley Ridge, through lots 986, 997, 1,034, 1,049 and 1,086, emptying into Yahoola creek, at the Lockhart mine. Extensive piles of gravel, along its course, tell a part of the story, of the large amount of placer-work done on it. Much of the material has been worked over, a number of times. On account of its location within the town of Dahlonega, probably no other placer in the county has been worked so much.

THE SHOCKLEY LOT, 891, 12th district, joins the Ivey lot, 860, on the east. Years ago, the man, from whom it gets its name, mined considerably, in a small way, the richest veins on the property. This is about the extent of the work done on this lot.

THE TODD LOT, No. 930, 12th district, joins the Shockley, on the

east. It lies at the foot of Crown Mountain, and is bounded on the south by the Bowen lot. This lot was once famous, for its valuable gravel placer, which was worked, many years ago, and which is still worked, in a small way, from time to time. Nearly all this lot is occupied by the large dike, which flanks Findley Ridge on the northwest; but I observed one or two very narrow belts of mica-schist saprolite intercalated in hornblende-schist; and these are said to be a part of the Barlow belt. This lot is owned by Dr. N. F. Howard, of Dahlonga, and his brother-in-law, Mr. I. L. Todd.

THE BARSHEBA WOODY LOT, *No. 725, 12th district*, is almost surrounded by the Barlow property, lot 748, of the Barlow, adjoining it, on the east; 726, of the Ralston, on the south; and 676, of the Old Gordon lots, on the west. It lies immediately between the Barlow mill and the Barlow cut; and auriferous veins, running through it, are supposed to be the same, as those of the Barlow cut. One of the veins, averaging about eighteen inches in thickness, has been prospected, at a number of places; and I was informed, that it yielded \$10.00 per ton on the mill. Near water-level, this vein contains a great deal of pyrite. The shafts do not extend below water-level. On each side of this vein is a stringer-lead, the thickness of each being about 150 feet. This property is owned by the heirs of Mr. Weir Boyd, deceased, of Dahlonga, and the heirs of Mr. Charles Davis, deceased, of Augusta, Ga.

THE TAHLONEKA BRANCH PLACER lies along the branch, from which it takes its name. It rises in the north edge of the gold belt, and flows into Cane creek. All along its course, are deep pits and extensive gravel piles, showing the large amount of work, done in the days of extensive gravel-placer mining in the county. This stream was formerly known as Winfield Branch. A fork of

it, known as Bath Branch, is, also, said to have yielded a considerable amount of gold.

THE DUNCAN BRANCH PLACER is an old gravel deposit, which lies along the Duncan branch. The stream, which is about a mile long, has a gradual fall, and the placer is well located, for working with the hydraulic giant. Very little work was done, on its upper end, for lack of sufficient water. This placer is said to have been very prolific; and it is still looked upon, as one of the noted gold producers of the county.

THE BRIAR PATCH PLACER consists of a number of lots, lying next to the Chestatee river, about the mouth of Ralston branch and of Town creek, the latter stream running through it. The Briar Patch extends from the river to a point, not far from the Barlow property, and consists of several hundred acres. The gravel beds, along its streams, were extensive, reaching well up on the sides of the ridges. The *débris* shows, that a large amount of work has been done upon it. It is believed, that this is still an excellent placer, and that, if worked with the hydraulic giant and elevator, it would yield well, as much of it has never been worked, on account of being below drainage. It is one of the largest placers in the county.

THE RUTHERFORD MINE was a gravel placer, lying along Ralston branch, just above the Briar Patch, and adjoining the Barlow property. The property consists of two 40-acre lots. It was owned by Prof. Williams Rutherford, for many years Professor of Mathematics in the University of Georgia. It was worked before the civil war.

THE KEYSTONE MINE lies on Cane creek, below the Barlow mill, not far above the mouth of the creek. The auriferous veins, running through it, were worked, for a while, quite regularly, between

1879 and 1883, by Messrs. John W. Stewart, Samuel Stambaugh and others, organized as The Keystone Co.

THE STEGALL PLACER, near Auraria, was worked by its owner, Mr. John P. Stegall, of Emerson, Ga., for three months, in 1888, water under pressure being used in mining. Mr. Stegall informed me, that he did this work, as much for recreation, as for anything else, and that he found quite a number of gold nuggets, of considerable size, the largest weighing $32\frac{1}{2}$ dwts., and a great many smaller ones, together with gold in fine grains. He stated, that, for the time, it paid him very handsomely. He also said, that, later on, a deposit was found, from which 5,000 dwts. of gold was taken. Much of the gravel on this property has not yet been mined. In addition to the auriferous gravel, quite a number of gold-bearing veins outcrop on the hillsides.

THE BELLE MINE is located about $1\frac{1}{2}$ miles southeast of Auraria. About 1881, a 20-stamp mill, operated by water-power, was erected on the property, and the mine and mill were operated, for about six or eight months. Mr. Leander Smith was its Superintendent.

THE HIGHTOWER MINE is located in the vicinity of the Wells mine. A 20-stamp mill was erected on it, about 1881, and it was operated, for a while, by Messrs. Daniel Howell & Co., with Mr. B. W. Davis as Superintendent. Nothing has been done on the property, for several years.

THE SALTONSTALL MINE is located near Auraria. In 1881, a new 10-stamp mill, operated by steam-power, was erected by a company from Lincoln, Nebraska, who began mining the veins on the property, but with what success, I am not informed. The property has been idle, for a long time.

THE WOODS MINE, in the same vicinity, was operated for a while by Mr. James E. Wood, of Auraria.

THE CLEVELAND MINE, also known as The Baggs Branch Mine, is located on the east side of the Etowah river, just south of the Josephine mine. It was owned by a company from Cleveland, Ohio, who, about 1878, began development work on it.

THE DANÆ MINE is located on the west side of the Etowah river, just below the Josephine mine. Operations were begun on it, by Messrs. Lombard & Imboden, at the time they were operating the Dahlonga mine. Preparations were made to build a mill, to be run by water-power, but work proceeded no further.

THE GOLD HILL MINE, which, in 1878, was being operated by its owners, a company from Boston, Mass., is located west of the Etowah river, a mile and a half south of the Battle Branch mine. There are several old cuts and tunnels on the property, which were worked, to only a limited extent.

THE ETOWAH MINE is located on a property, consisting of *lots 117-120, inclusive, 141, 142 and 178, 15th district*, lying along the Etowah river, and along the county-line between Lumpkin and Dawson. Mining, in a small way, has been done on this property.

THE DREDGE BOATS ON THE CHESTATEE RIVER

About sixteen years ago, the first dredge boat was put into the Chestatee river, for the purpose of dredging the bottom and washing the dredgings for gold. Since then, six or eight boats have been operated, with varying results. At present there are three of these boats in the river, only one of which is at work. Of the two not at work, the one which was operated by Messrs. Benham &

Helmer, stopped work about a month ago.¹ Up to the time they stopped it is said that they were having great success. As a result of one week's work, about six weeks ago, at an expense of \$108.00 it is said they washed out 650 pennyweights of gold. In the case of the second boat, operated by Messrs. Birch & Ammons, of Kansas City, Mo., about a year ago, it was swept away from its fastenings by a freshet, soon after it began operating, and, colliding with an iron bridge, it was practically ruined. Work of repair has been going on for some time, and it will be ready, soon, to resume work. About three years ago, Mr. H. D. Jaquish, of Chicago, bought a boat, and, with Mr. Thomas Conner, his partner, began operating it, on a section of the river leased from property owners along its banks, recovering the gold in sluices, 75 or 80 feet long, brought by pontoons alongside the dredge. I am informed by Mr. Jaquish that the work has paid well.

¹ August, 1896.

CHAPTER XXIII

By W. S. YEATES, STATE GEOLOGIST

STATISTICS OF THE GOLD PRODUCTION OF GEORGIA

The following shows the gold production of Georgia, from 1880 to 1895, inclusive, as given in the reports of the Director of the Mint: —

1880	.....	\$121,880
1881	.....	125,000
1882	.....	312,500
1883	.....	200,000
1884	.....	137,000
1885	.....	136,500
1886	.....	153,500
1887	.....	115,500
1888	.....	104,837
1889	.....	108,069
1890	.....	101,318
1891	.....	80,622
1892	.....	95,251
1893	.....	100,375
1894	.....	99,095
1895	.....	128,403

CONCLUSIONS

Having been often asked, since my investigations on the Gold Deposits of Georgia were begun, if gold mining in Georgia would pay, it has occurred to me, that this question might arise in the minds of others, and that it might be generally answered, by giving some conclusions, reached, during the course of these investigations.

Certain kinds of gold mining in Georgia will not pay; certain other kinds will pay. With the subject thus classified, it may be well to consider those of the first class, so as to eliminate them altogether, before taking up the second class.

The first question to be settled, when one is considering a mining investment, is whether or not a sufficient quantity of the mineral or metal sought is present, on the property under consideration, in such condition, as to make the mining of it a source of profit. This may be stated as a business axiom. It is natural, then, for one to suppose, that investors would satisfy themselves on this point, before turning their funds over to a certain class of promoters, to be spent in sumptuous living. But many mine-wrecks in Georgia and other Southern States are due to this cause. Several cases, similar to the one related on page 369 of this bulletin, were disclosed, in the course of my efforts to secure historical facts about the mines; and it really seemed, as if much of the mining, done, had been, in furthering the schemes of the crafty speculator. Akin to this, has been the wanton extravagance and the ignorance of mining, in some of those, who have been sent to the Georgia gold mines, as superintendents and managers of mining properties. Gold mining, under

the conditions, cited, does not pay. Again, many of the gold-bearing veins in Georgia, which have produced handsomely, until the free-milling ore has given place to the sulphides, have been abandoned, because it is not possible, to recover from the latter, on the amalgamated plates of the stamp-mill, anything like the gold values, shown by assay, to be in the ores. Therefore, milling auriferous-sulphide ores on the stamp-mill, and allowing the sulphides to go to waste with the tailings, does not pay. Enlarging on the axiom laid down, one must be sure, that he has an abundance of gold ore, to justify a large outlay in an expensive mining-plant. With the contingencies attending gold mining, wherever undertaken, it is always best, that sufficient ore, to warrant the expenditure, be taken out, or that it be "in sight," before the extraction plant is erected. The latter proposition requires a development of the property, more or less extensive, according to the conditions. This principle has been violated in Georgia, time and again, often resulting in failure. Another most important factor, in making gold mining pay, is the employment of a well-trained and competent mining engineer, of strict probity of character, as one of the local officers of the concern, affording him the proper facilities for the performance of his duties. I mention this, here, because the lack of such an officer has resulted in the loss of thousands of dollars and the failure of many mining enterprises, in this State. Another deterrent, which may be mentioned, in this connection, is a certain class of persons, of unknown antecedents, who, from time to time, have appeared upon the scene of action, in this and other Southern States, calling themselves "mining experts," and hailing vaguely from the Western States, South Africa or some other well known, but distant, gold-mining country. These men manage to get themselves well advertised, by their remarkable assurance and

the sensational claims, they make ; and, for a while, they thrive on the credulity of some of those, not well informed, as to the character and occurrence of ores. These fellows sometimes claim, that the Lord has blessed them with peculiar and mysterious gifts, by which they can detect valuable ore deposits, hidden many feet below the earth's surface ; the claims of others are not so pretentious, though the damage they do is often quite as great. It has been my fortune, to come in brief contact with several of these peripatetic "mining experts," who were temporarily in Georgia, for business. They never become permanent citizens ; the reputation, they make, keeps them moving. He, who mines gold on the advice of this class of "experts," will doubtless find, that gold mining does not pay. It must not be inferred, that I, in any way, depreciate that worthy class of mining men, who come from a distance, to enter, or promote, legitimate mining, and whose claims for preferment are put, within the bounds of business principles.

But there are conditions, under which gold mining in Georgia will pay. It has been shown, in the preceding pages, that there are many belts of soft, decomposed auriferous mica-schists, containing quartz stringers, which frequently carry considerable gold, making the entire belt a low-grade ore-body, which, when worked intelligently and with proper economy, will yield very fair average returns. While the extravagant method of flooding these ores through a flume, from the open cut to the mill, can be operated at a cost of, from 12 to 15 cents per ton, including the cost of milling ; yet, so much of the gold is lost by this process, unaided by some device, that will recover both the flour-gold, which is carried with the water through the rack, and the gold, coated by a film of iron oxide, which, for that reason, passes over the plates, that the ore must, as a rule, average considerably more than the cost of extraction, in

order that it shall pay a fair profit on the investment. But these saprolites offer the advantage of large handling; and I am of the opinion, that, when worked on a large scale, and with proper equipment, for recovering the maximum amount from the assay values, that these belts will pay handsome dividends. This being true, those of the same kind, which show higher assay values, will yield proportionately higher returns. To be more specific:— It will pay to mine, in large quantities, the soft auriferous schists, which give an average assay value of 50 cents per ton. These schists have undoubtedly been the source of much of the gold of the gravel beds. The auriferous belts are of sufficient thickness, to furnish a large quantity of ore, for a considerable time; but this time is limited, by the depth of the saprolite, which is never more than 125 feet, being underlaid by the undecomposed rock, from which it was derived.

One of the greatest impediments, that we have had to contend with, in making an economic survey of the gold deposits of Georgia, is the fact, that so little development work has been done by the owners and operators of the properties; and the further fact, that it has been so long, since mining operations ceased, in most of the prospects and mines, that the veins are covered with earth, which has caved in, on them, rendering it impossible, with the means at our command, to take the necessary samples for assay. This is greatly to be deplored; for, in such cases, the value of the veins as ore-producers cannot be estimated, except by hear-say evidence. However, it will be seen from the assays, from such veins, as we have been able to sample, that, in many cases, there is a considerable margin beyond the average of some of the best paying mines, now being worked in different parts of the world; while others of the veins, on assay, show high-grade ores. Some

of the mines, it has been stated, have reliable records, of producing many remarkably rich pockets. When it is taken into consideration, that gold mining in Georgia, in the past, has been conducted by the old methods of extraction, on free-milling ores, which had, as a rule, lost considerable of their gold, since the decomposition of their sulphides; and that nearly all the gold, contained in the sulphides milled, was lost; and further, that the sulphide ores contain a much higher assay value, which, now, is practically all saved by the chlorination process of extraction, the conclusion is logical, that a bright future, in legitimate gold-mining, awaits this State. There are large numbers of its veins, which yielded excellent returns in gold, until they were abandoned, because of the inability of the operators to cope with the richer, but entirely refractory, sulphide ores. Now, that all the gold, with the exception of a small margin, can be extracted from these, at a small expense, there must be, in the near future, a strong demand for these old abandoned, auriferous-sulphide veins.

What is the mining and extraction cost of these sulphide ores? A statement, as to the cost of mining operations in Georgia, and one, showing the cost, at some one of the low-grade-ore mines, well known as a regular dividend-producer, will probably best answer this question. Wood, as fuel, is to be had, delivered at the mines, in Georgia, for from \$1.25 to \$1.50 per cord. Laborers get from 80 cents to \$1.00 per day. The country roads in North Georgia are fairly good, except after long continued rains; and machinery can be hauled from railroad stations, to the mines, when necessary, with comparatively little expense, hardly any haul being greater than thirty miles, and most of them, less. The official report of The Alaska Treadwell Gold Mining Co., for the fiscal year, ending May 31st, 1896, gives interesting statistics, as to

their operations, some of which I quote, below. Their mines and works are located on Douglas Island, Alaska, where they have such disadvantages to overcome, as a very cold climate; the great distance from the marts of the world; difficulties in obtaining labor; etc. The average value of the ore handled, during the year, is given, as \$3.05 per ton; the number of tons mined and milled, 263,670, worth \$804,066.73; the total cost of operating, \$306,724.51; net profit for the year, \$497,342.22, within a small fraction of 10 per cent. of their capital stock. A dividend of 9 per cent. was declared, and the remainder was carried over as surplus, for continuing operations. I take bodily from their report the following, as to cost of labor: —

“Wages were paid, as follows: —

Miners	-----	\$2.50 per diem, and board and lodging.
Laborers	-----	\$2.00 per diem, and board and lodging.
Drillmen	-----	\$2.50 in summer, and \$3.00 in winter, with bonuses and board and lodging.
Indians	-----	\$2.00 per diem, paid daily.

Mill Men: —

Concentrators	-----	\$65.00 to \$100.00 per month, with board and lodging.
Feeders	-----	\$70.00 to \$100.00 per month, with board and lodging.
Amalgamators	-----	\$90.00 to \$100.00 per month, with board and lodging.

Chlorination Works: —

Roasters	-----	\$2.50 per diem, with board and lodging.
“ (Helpers)	-----	\$2.00 per diem, with board and lodging.
Floormen	-----	\$2.00 and \$2.25 per diem, with board and lodging.

Machine Shops: —

Mechanics \$2.00 to \$6.00 per diem, with board and lodging.

Blacksmiths \$4.00, with board and lodging.

“ (Helpers) . . \$2.00, with board and lodging.

With all the heavy expense of mining and extraction, still, by careful attention to every detail, and by the handling of large quantities of ore, the total cost of operating was \$1.16 per ton, which includes mining, milling, chlorinating and the general expenses of the company.

With the exceptional advantages, which the Georgia mines have, such as easy accessibility, fine climate, in which operations can be carried on, during all seasons of the year; the excellent natural mining facilities; the small cost of operating; and other conditions especially favorable to mining operations, I am strongly of the opinion, that there are many gold deposits in Georgia, that can be made to pay better dividends, than those of The Alaska Treadwell Gold Mining Co.

So far as has been tried, the barrel-chlorination process, as modified by Mr. Adolph Thies, Superintendent of the Haile gold mine in South Carolina, has proved highly successful, in extracting the gold from the sulphides in the ores of this State. The ores, with a few exceptions, are generally uniform in character. I have classified them, as follows: —

KINDS OF ORE

I. THE PLACER DEPOSITS.

a. *Auriferous gravel.*

b. “ *Saprolite.*

II. AURIFEROUS QUARTZ VEINS.

- a. Containing little or no Sulphides, either above or below Water-level.*
- b. Containing Sulphides below Water-level, and free-milling, "honey-comb" Quartz above Water-level.*
1. Containing the Sulphides, Pyrite or Chalcopyrite, only.
2. Those containing Galena, Pyromorphite etc.

III. HARD HYDROMICA SLATES AND GNEISSES, CONTAINING SMALL LENSES AND RIBBONS OF AURIFEROUS QUARTZ.

The large quantities of gold nuggets, which have been found in the old gravel-placers, are strong arguments, that the veins, which produced these, may be expected to produce others, from time to time. What is needed is development-work. This cannot be done, without expenditure of money. On several occasions, western miners, visiting the Georgia gold-fields, have remarked to me, in casual conversation, that, if such prospects, as they saw in Georgia, were in the West, money in abundance could be had for their speedy development. I do not believe, that the Georgia gold mines may be expected to produce bonanzas; and the fortunes, to be made in a day will be exceedingly rare; but there is every reason to believe, that, when properly developed and equipped for extensive operations, the gold deposits of Georgia will rank among the best dividend-producers of the world.





INDEX

A

Acid Rocks	822-828
Addendum	819
Africa, Gold Production of, for 1895	10
Alaska, Occurrence and History of Gold in,	22-28
Allatoona Vein, The,	218-220
Ammons Branch Mine, The,	99-100
Amphibolite (Hornblende-schist)	826, 827-828, 829-880
Appalachian Division, The, Occurrence and History of Gold in,	25-82
Asbury Property, The,	78-79
Asia, Gold Production of, for 1895	10
Astinol Company's Property, The,	289-240
Atkinson Property, The,	72-74
Auriferous Deposits of Lumpkin County, The,	298-810
Austin Mines, The,	284
Australasia, Gold Production of, for 1895	10
Australia, Occurrence and History of Gold in,	17-18
Austria-Hungary, Occurrence and History of Gold in,	12-18
Avery Mine, The,	222

B

Baggett's, John, Property,	241
Bailey Property, The,	209
Baker & Sons' Placer Property	70-71
Barlow Mine, The,	461-468
-----, Assay of Samples from,	464
-----, Section along the Pres- ton Cut	463
-----, Section across the Bar- low Cut	465
Barsheba Woody Lot, The,	522
Bartley, H. W., Property, The,	97
Barton Property, The,	286
Bartow County	218-224
Basic Rocks	323-330
Bast Mine, The,	364-371
-----, Assay of Samples from,	366
Battle Branch Mine, The,	475-478
Belle Mine, The,	524
Black Belt, The,	281-282
Black Belts, The,	340-348

Black Belts, The, Assay of Samples from,	348
Bean, T. S., Property, The,	105-106
Beds, The Gravel, in Lumpkin County	291-294
Bell Property, The,	206-207
Betz Mine, The,	478-481
-----, Assay of Samples from,	480
-----, Section through the Schists etc.,	479
Blake Property, The,	72
Blalock Property, The,	98
Biotite-Epidote Schist	824
Boly Field Mine, The,	519-520
Bonner Mine, The,	245-248
-----, Assay of Samples from, -----,	247-248
-----, Diagram of,	246
Bowen Lot, The,	845-846
-----, Assay of Samples from,	845
Briar Patch Placer, The,	523
British Columbia, Occurrence and History of Gold in,	20-21
British Guiana, Occurrence and History of Gold in,	19
British India, Occurrence and History of Gold in,	14
Brogden, Will, Property, The,	147
Brown Shaft, The,	126
Buffington Mine, The,	520
Burt, Frank, Property, The,	188
Butt Mines, The,	59

C

Calhoun Mine, The,	495-501
-----, Assay of Samples from,	500
-----, Section through,	500
California, Occurrence and History of Gold in,	21-22
Campbell, Ad., Property, The,	155
Canada, Occurrence and History of Gold in,	20
Capps Mine, The,	846-847
-----, Assay of Samples from,	848
Carticay Mine, The,	259-261
Carroll County	242-248
Casteel, J. C., Property, The,	194

- Casteel, J. C., Property, The, Assay of Ore
 from, 194
 Cavender's Creek Mining Property, The, 506-513
 Assay
 of Samples from, 511-512
 Charles Property, The, 150-151
 Chastain Branch Mine, The, 111-112
 Diagram of, ... 111
 Cherokee County 174-217
 Cherokee Mine, The, 197-198
 Chestatee Mine, The, 501-506
 Assay of Samples from, 506
 Chestatee River, The, Dredge-boats on, 526-528
 Chester Prospect, The, 191
 Childs Mine, The, 89
 China, Occurrence and History of Gold in, 14
 Church Lot, The, 162-168
 Clarkson Mine, The, 202-208
 Clay Deposits, Hillside, 294-296
 Cleveland Mine, The, 525
 Clopton Property, The, 244
 Cobb County 225-228
 Coggins Property, The, 202
 Collins Property, The, 154
 Columbia Mine, The, 348-351
 Assay of Samples from, 350
 Conclusions 528-535
 Conley Mine, The, 47
 Coora Lee Property, The, 515
 Cox Property, The, 183, 207-208
 Coosa Creek Placer Mine, The, 129-181
 Creighton Mine, The, 175-182
 Crescent Gold Mine, The, 445
 Crown Mountain Gold Property, The,
 Sketch of Hornblende Masses of, 284
 Crown Mountain Property, The, 331-344
 Linear
 View of the East Tunnel, ... 333
 Linear
 View of the North Tunnel, ... 335
 Linear
 View of the South Tunnel, ... 334
 Rocks
 and Ores of, 336-344
 Section
 along the East Tunnel of, ... 337
 Tunnels
 of, 338-339
 Culp Property, The, 195-196
 Currahee Mine, The, 141
- D**
- Dahlonga 270-271
 Dahlonga Gold Belt, The, 33-35
 Dahlonga Mint, The, Annual Coinage of
 Gold at, 30-31
- Danae Mine, The, 525
 Davis Mine, The, 191-192
 Dawson County 158-170
 Dean Gold Mines, The, 55
 Dean Property, The, 249
 Dillard, T. M., Property, The, 98
 Dikes, Granite, 289
 Douglas County 237-241
 Dredge Boats on the Chestatee River,
 The, 525-526
 Dry Hollow Mine, The, 520-521
 Duncan Branch Placer, The, 528
 Dunnaway Property, The, 232
 Durgy, T., Property, The, 240-241
- E**
- Edwards, T. G., Property, The, 105
 Elseman Property, The, 223
 Ellsworth Property, The, 163-164
 Elrod Property, The, 136-137
 Etowah Mine, The, 525
 Europe, Gold Production of, for 1895 10
 Evans Property, The, 204-206
 Assay of Samples
 from, 206
 Cross-section
 through, 204
 Evans, Bright, Property, The, 91-92
 Evans, T. D., The Property of, 211
- F**
- Fannin County 262-264
 Faults, 296
 Findley Mine, The, 371-383
 Assay of Samples from, ... 374
 Fish Trap Mine, The, 447-451
 Forsyth County 149-157
 Fowler & Parks Property, The, 152
 France, Occurrence and History of Gold in, 13
 Franklin Mine, The, 175
 Frazier Mine, The, 47
 Free Jim Mine, The, 433-443
 Fulton County 172-173
- G**
- Garnet Mine, The, 516-519
 Assay of Sample from, ... 519
 Plan of Open Cuts of, ... 517
 Garnetiferous-Mica (Biotite) Schist, 326
 Georgia, Occurrence and History of Gold
 in, 29-32
 Statistics of Gold Production of, ... 527
 Total Production of Gold and Sil-
 ver of, 32
 Georgiana Mine, The, 212-213

- Germany, Occurrence and History of Gold
 In, 18
 Glade Mine, The, 220-221
 Gilmer County, 254-261
 Gneisses, The Ordinary, and Mica-schists 279-280
 Gold Deposits, The, Geology of, 278-279
 — Hill Mine, The, 525
 — Mining, History of, 271-275
 — Production of Georgia, The, Statistics
 of, 527
 — the World, for 1895, 10-12
 — Africa, for 1895, 10
 — Asia, for 1895, 10
 — Australasia, for 1895, 10
 — Europe, for 1895, 10
 — North America, for
 1895, 11-12
 — South America, for 1895, 11
 Gold, The Occurrence and History of, 7-82
 — in Alaska 22-23
 — Austria-Hun-
 gary 12-13
 — Australia 17-18
 — British Colum-
 bia 20-21
 — British Guiana, 19
 — British India, 14
 — California 21-22
 — Canada 20
 — China 14
 — France 13
 — Germany 13
 — Georgia 29-32
 — Great Britain, 13
 — Italy 13
 — Japan 15
 — Mexico 20
 — Nevada 22
 — Nicaragua 20
 — Oregon and
 Washington, 22
 — Russia 12
 — South America, 18-19
 — South Africa, 15-16
 — Sweden 13-14
 — The Appalachi-
 an Division, 25-32
 — The Rocky
 Mountain Division, 23-25
 — The Western
 Coast, 16-17
 — The United
 States 21-32
 Golings, W. M., The Property of, 221
 Goodwin & Little Property, The, 173-173
 Gordon Mine, The, 459-461
 Gravel Beds of Lumpkin County, 306-310
 Great Britain, Occurrence and History of
 Gold in, 18
 Griscom Mine, The, 361-363
 Gwinnett County, 142-148
- ## H
- Habersham County, 101-106
 —, Other Properties in, 106
 Hadaway, W. H., Property, The, 228
 Hall County, 132-141
 Hamby Mountain Mine, The, 47
 Hamby Placer, The, 90
 Hamilton Mine, The, 226-227
 Hand Mine, The, 415-426
 —, Assay of Samples from, 420
 Haralson County, 249-253
 Harris Property, The, 148
 Hart Mine, The, 244-245
 Hedden Placer Mine, The, 84-88
 Henderson Property, The, 74-75
 Hedwig Mine, The, 470-475
 —, Section across the Hed-
 wig Cut, 472
 —, Transverse Section of
 the Chicago and
 Georgia Cut, 478
 Hill, Wellborn, Mine, The, 122-126
 —, Assay of Ore
 from, 126
 Hightower Mine, The, 524
 Hobbs Mine, The, 281-282
 Hodges Property, The, 281
 Hollins Mine, The, 250-252
 Holt Property, The, 257-258
 Hornblende-Mica Schist 823
 Hornblende-Mica (Biotite) Schist 825-826
 Hornblende-schist, The, Discussion of,
 284-289, 343-344
 Horner Mine, The, 446-447
 Horse Vein, The, 120
 House Property, The, 225-226
 Howard, John J., The Property of, 224
 Hunt Property, The, 128
- ## I
- Ivey Mine, The, 451-459
 —, Assay of Samples from, 457
- ## J
- Jarret Property, The, 89
 Japan, Occurrence and History of Gold in, 15
 Johnson Property, The, 135
 Jones Mine, The, 520
 Josephine Mine, The, 484-486
 Jumbo Mine, The, 513-515
 —, Assay of Samples from, 514

K

- Kellogg Mine, The, 209-210
 Kemp, J. B., Property, The, 227
 _____, Assay of Samples from, 227
 Kendrick Property, The, 225-226
 Keystone Mine, The, 523-524
 Kinds of Ore, 535
 Kin Mori Mines, The, 158, 164-169
 Kitchen Property, The, 214-216
 _____, Assay of Samples from, 215-216

L

- La Belle Mine, The, 192-196
 Lamar Mine, The, 88- 99
 La Prade Placer, The, 104
 Latham Property, The, 186-187
 _____, Assay of Samples from, 187
 Lawrence Mine, The, 448-444
 Letter of Transmittal, 5
 Little Property, The, 156-157
 Little & Goodwin Property, The, 172-173
 Lockhart Mine, The, 383-399
 _____, Assay of Samples from, 392, 393, 394
 _____, Map of the Lockhart & Singleton Lots, .. 395
 Longstreet Property, The, 188-139
 Looper Property, The, 170
 Lot 8, 17th District, 119-120
 Lot 20, 9th District, 127
 Lot 48, 17th District, 115-116
 Lot 208, 3rd District, 187
 Lot 208, 15th District, 203
 _____, Assay of Ore from, 208
 Lot 821, 7th District, 268-264
 Lots 63, 64 and 81, 15th District, 199
 Loud Mine, The, 75- 78
 Lumpkin County, 265-528
 _____, Auriferous Deposits of, 298-319
 _____, Character of the Ore in, 306-310
 _____, Clay Deposits in, 294-295
 _____, Climate of, 314
 _____, Collateral Resources in, 313-314
 _____, Distribution of the Auriferous Deposits in, 298-299
 _____, Faults in, 296-298
 _____, General Remarks on, 265-270
 _____, Geology of the Gold Deposits in, 278-279

- Lumpkin County, Gneisses and Micaschists, The, in, 279-280
 _____, Gravel Beds, The, in, 291-294
 _____, Granite Dikes in, 289
 _____, History of Gold Mining in, 271-275
 _____, Hornblende-schists in, 284-289
 _____, Hydraulic Giant, The, in, 317
 _____, Hydraulic Gravel Elevator, The, in, 318
 _____, Improvements on the Mining Properties in, 310-313
 _____, Labor in, 314
 _____, Methods of Mining in, 315-318
 _____, Mint Statistics of, 318-319
 _____, Nature of the Deposits in, 299-306
 _____, Other Mica-schist Saprolites in, 282-283
 _____, Quartzose Slates in, 290
 _____, Recent Valley Deposits of, 294
 _____, Rocks of More Recent Origin in, 291
 _____, Soil of, 295-296, 314
 _____, Stamp-mills in, List of, 311
 _____, Steam Dredge-boats in, 318
 _____, Timber in, 314
 _____, Topography of, 275-278
 _____, "Yellow" and "Black" Belts in, 280-282
 _____, Water Resources of, 313
 Lumsden Property, The, 36- 39
 _____, Assay of Samples Taken from, 39
 _____, Sketch-map of, 35

M

- Macou Property, The, 194-195
 _____, Cross-section through, 195
 Malden Property, The, 116-117
 Mammoth Mine, The, 140
 Map of the Northern Adjoining Corners of Towns and Union Counties, 123
 Martin Mining Property, The, 45- 54
 Mary Henry Mine, The, 430-438
 _____, Assay of Samples from, 435
 Matthews Property, The, 233-234
 McBrayer Property, The, 249
 McCandless Property, The, 198-199

McCandless Property, The, Assay of Ore from,.....	199
McDaniel, I. O., The Property of,.....	228
McIntosh Lot, The,.....	482-483
McLain Property, The,.....	204
M'Guire Property, The,.....	160-170
Mercer Mines, The,.....	59
Merck Property, The,.....	189
Merritt Property, The,.....	60-70
Metamorphic Rocks, The, A Preliminary Petrographic Report on, in and around Dahlonega	320-330
Mexico, Occurrence and History of Gold in, 20	
Mica-schist Sapolites	282-283
Mica-schist and Gneisses	279-280
Mica-schist, Auriferous,.....	305
Mica (Muscovite-biotite) Schist.....	327
Michigan Gold Mining Company's Property, The,.....	282-283
Milton County	171
Moore & Brogden Property, The,.....	145
Moore Girls' Mine, The,.....	96-97
Morse Property, The,.....	153-159
Murdock Vein, The,.....	114-115

N

Nacoochee Hills Gold Mining Co's. Property, The,.....	43-45
Nacoochee Valley Mining Properties, Map of the,.....	44
Nancy Brown Mine, The,.....	117-119
....., Assay of Samples from,.....	119
Nevada, Occurrence and History of Gold in, 22	
Newton Mine, The,.....	108-111
....., Diagram of,.....	109
Nicaragua, Occurrence and History of Gold in,.....	20
Nichols Mine, The,.....	47, 102-104
Norrell Mine, The,.....	487-489
North America, Gold Production of, for 1895,.....	11-12

O

Odom Property, The,.....	134
Old Columbia Mine, The,.....	521
Old Gum Log Mine, The,.....	127-128
Oliver Mine, The,.....	47
Ore, Kinds of,.....	535
Oregon, Occurrence and History of Gold in, 22	
O'Shields Property, The,.....	140

P

Page Property, The,.....	90-91
Palmour Property, The,.....	159-161
Parker's, Dr., Property,.....	284

Parks Mine, The,.....	47
Parks Property, The,.....	134-135
Parks & Fowler Property, The,.....	152
Pass Property, The,.....	187-188
Paulding County	229-236
Payne, Kendrick, Randall and House Properties, The,.....	225-226
Percy Mine, The,.....	145
Piedmont Property, The,.....	142-144
....., Assay of Ore from, 144	
Pine Mountain Property, The,.....	287-288
Plattsburgh Ore, The, Assay of,.....	41
....., Mill and Concentration Test of,.....	41
Plattsburgh Property, The,.....	40-42
Poor, William, Property, The,.....	211-212
Powell Mine, The,.....	47
Porter Springs	271
Potosi Mine, The,.....	135-136
Potosi Mining and Milling Co., The,.....	136
Preacher Mine, The,.....	351-350
....., Assay of Samples from,.....	359
....., Mill of,.....	360
Profile of the Big Sulphuret Vein, Kin Mori Mines,.....	167
Putnam Mine, The,.....	196-197

Q

Quartz Amphibolite (Hornblende-schist).....	
.....	324-325, 328, 329, 330
Quartz Schist	322-323

R

Rabun County	80-100
Ralston Mine, The,.....	468-470
....., Assay of Sample from, 470	
Randall, Payne, Kendrick and House Properties, The,.....	225-226
Reaves Property, The,.....	78
Remarks, General, on Lumpkin County.....	265-270
Resources, Collateral,.....	318-314
Richardson Mine, The,.....	47
Richards Property, The,.....	185-186
Rider Mine, The,.....	446
Roach, Thomas, Property, The,.....	240
Roberts Property, The,.....	147
Robertson Property, The,.....	222
Rocks of More Recent Origin.....	291
Rocky Mountain Division, The, Occurrence and History of Gold in,.....	23-25
Royal Gold Mining Co., The,.....	250
Royal Mine, The,.....	250
Rudicil Mine, The,.....	188-189
Russell Mine, The,.....	47
Russia, Occurrence and History of Gold in, 12	
Rutherford Mine, The,.....	523

S

- Saltonstall Mine, The,..... 524
 Sandow Mine, The,..... 188-184
 Sawnee Mountain Property, The,..... 182-184
 Schists 822-830
 Screamer Mountain..... 92
 Settles Property, The,..... 155
 Sheffield & Heldt Property, The,..... 220-280
 Shelly Property, The,..... 144-145
 _____, Assay of Ore from,.... 145
 Shelton Property, The,..... 161-162
 _____, Assay of Ore from,.... 161
 Shockley Lot, The,..... 521
 Simmons Property, The,..... 145-146
 _____, Assay of Ore from, 146
 Singleton Out, The, Assay of Samples from,
 _____, 407, 408, 409
 _____, Sketch of, at the West
 _____, End of,..... 404-406
 Singleton Hill, Sketch of a Horizontal Pro-
 jection of the,..... 408
 Singleton Mine, The,..... 400-418
 Sixes Mine, The,..... 190-202
 Slates, Quartzose,..... 290
 Smith Mine, The,..... 92-95, 112
 Smith, S. R., Property, The,..... 184-185
 Soil..... 295-296
 South Africa, Occurrence and History of
 Gold in,..... 15-16
 South America, Gold Production of, for 1895 11
 _____, Occurrence and History of
 _____, Gold in,..... 18-19
 Southern States Mining and Exploring
 Co.'s Property, The,..... 288-289
 Stacy Mine, The,..... 248
 Statistics of Georgia, White's,..... 267
 Statistics of Gold Production of Georgia, 527
 St. George Property, The,..... 55-58
 _____, Map of,..... 56
 Stansill Property, The,..... 216-217
 Stegall Placer, The,..... 524
 Stonesypher Property, The,..... 95-96
 Strickland Property, The,..... 151
 Stringer Leads, Description of,..... 800
 _____, Character of the Ore of,.... 810
 Struby Property, The,..... 116
 Sweden, Occurrence and History of Gold
 in,..... 13-14

T

- Tahlonaka Branch Placer, The,..... 522-523
 _____, Mine, The,..... 418-415
 Tanyard Branch Placer, The,..... 521
 The Glades 182-183
 Thompson Property, The,..... 67-69
 Thomason's, J. W., Property,..... 250

- Todd Lot, The,..... 521-523
 Tonton Mines, The,..... 50
 Topography 275-278
 Towns County 107-121
 Transported Clays, The,..... 336
 Tripp Property, The,..... 213-214
 Turkey Hill Mine, The,..... 480-494
 Turkey Pen Mine, The,..... 250

U

- Union County..... 122-131
 United States, Occurrence and History of
 Gold in,..... 21-32

V

- Valley Deposits, Recent, 294

W

- Washington 23
 Wells Mine, The,..... 438-484
 Westbrook, T. N., Property, The,..... 189
 Western Coast, The, Occurrence and Histo-
 ry of Gold in,..... 16-17
 Whitaker Property, The,..... 253-259
 White County, 33-79
 White Path Mine, The,..... 9, 254-257
 _____, Diagram of,..... 255
 White-McGhee Mine, The,..... 47
 _____, Branch Vein,
 _____, Assay of the,.... 58
 White's Statistics of Georgia,..... 267
 Willbanks, C. T., Property, The,..... 105
 Williams Property, The,..... 208, 210-211
 Wills Creek Property, The,..... 113
 Wood, Rufus C., Mining Property, The, 530
 Wood Mine, The,..... 534
 Worley Mine, The,..... 130-191

Y

- Yahoola Mine, The,..... 426-430
 _____, Assay of Samples from, 429
 _____, Ideal Sections through
 _____, the Auriferous Schists 428
 Yellow Belt, The,..... 282
 Yellow Belt, The Schists of,..... 338-340
 _____, Assay of Sam-
 _____, ples from,.... 339
 _____, Panning Tests
 _____, of,..... 340
 Yellow and Black Belts, The,..... 280-282
 Yonah Gold Mines, The,..... 59
 Yonah Land & Mining Company's Prop-
 erty, The,.... 50-63
 _____, Assay of
 _____, Samples from..... 66-67
 Yorkville Mine, The,..... 285-286



RETURN TO DESK FROM WHICH BORROWED

**This book is due on the last date stamped below, or
on the date to which renewed.**

Renewed books are subject to immediate recall.

[illegible]

General Library
University of California
Berkeley

U.C. BERKELEY LIBRARIES



C033290715